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Eight archeological sites on the Pinon Canyon Maneuver Site were excavated and evaluated for potential nomination to the National Register of Historic Places in the summer of 1994. These sites date from the first millennium B.C. to the Historic Period. The sites show evidence for use of different environmental zones in the PCMS through a wide-spectrum hunting-and-gathering subsistence strategy, as well as the use of local lithic resources. The evaluative work at these sites, supplemented by specialized pollen analysis, as well as radiocarbon and obsidian hydration dating assays, contributes to our understanding of the archaeology not only of the PCMS but of southeastern Colorado in general.

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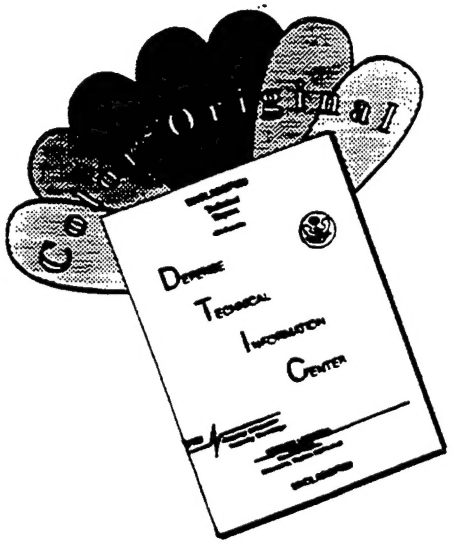

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Evaluative Testing of Eight Archaeological Sites in the Pinon Canyon Maneuver Site, Las Animas County, Colorado

By

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and
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Research administered by:
Midwest Archeological Center
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1996

POPULAR ABSTRACT

Archeological investigations indicate that the Pinon Canyon Maneuver Site, located in Las Animas County, Colorado, has been inhabited since approximately 10,000 years ago. During the prehistoric period, which lasted until about 250 years ago, inhabitants lived off the wild game and plants found in the area. Their remains indicate that they lived in both tipis and in rockshelters. About A.D. 1,000, these prehistoric peoples began to construct stone dwellings that were often fortified and placed on defensible positions. With the coming of the Europeans, the lifestyles of the prehistoric inhabitants changed drastically, and they were forced onto reservations in the 19th century. During the historic period both Hispanic and Anglo settlers farmed and ranched what is now the PCMS. In 1983, the U.S. Army acquired the land, which is now used as a tank-training area. Eight archaeological sites were test excavated in the summer of 1994. These sites date from the first millennium B.C. to the Historic Period.

TECHNICAL ABSTRACT

Eight archeological sites on the Pinon Canyon Maneuver Site were excavated and evaluated for potential nomination to the National Register of Historic Places in the summer of 1994. These sites date from the first millennium B.C. to the Historic Period. The sites show evidence for use of different environmental zones in the PCMS through a wide-spectrum hunting-and-gathering subsistence strategy, as well as the use of local lithic resources. The evaluative work at these sites, supplemented by specialized pollen analysis, as well as radiocarbon and obsidian hydration dating assays, contributes to our understanding of the archaeology not only of the PCMS but of southeastern Colorado in general.

MANAGEMENT SUMMARY

In the summer of 1994, eight archeological sites on the Pinon Canyon Maneuver Site (PCMS) were tested for eligibility to the National Register of Historic Places. Based on their potential to contribute significantly to our understanding of the prehistoric and historic past of the PCMS, five of the sites were considered eligible for nomination. This report documents the results of this testing.

Eligibility testing at site 5LA3347 was conducted from September 7 through September 9, 1994. A total of 14 person days were spent at the site. Archeological investigations included the production of a site map with the EDM, field analysis of all visible surface artifacts, and excavation of thirty-three shovel tests and five test units. A buried cultural horizon was identified in one of the test units, and a prehistoric use surface with a sandstone metate and an anomalous rock feature was identified in two of the other units. The results of these investigations demonstrate that the site is eligible for nomination to the NRHP under Criterion D: the potential to yield significant information about the prehistory of the inhabitants of the PCMS.

Site evaluation for the NRHP was conducted at 5LA3570 by Fort Lewis College from August 28 - 30 and September 7, 1994. A total of 22 person days were spent at the site. Work completed at the site consisted of EDM mapping of surface artifacts and features, field analysis of surface artifacts, and the excavation of four test units A section of the cutbank along Lockwood Arroyo was examined for a more detailed geoarcheological assessment. One eroding hearth feature (Feature 11) was partially excavated and subsequently stabilized. The results of field and laboratory analysis have demonstrated that this site is eligible for nomination to the NRHP under Criterion D: the potential to yield significant information about the prehistoric lifeways of the inhabitants of the PCMS.

Site evaluation for the NRHP was conducted at 5LA4606 by Fort Lewis College from September 9 through September 11, 1994. A total of 11 person days were spent at the site. Work completed at the site consisted of EDM mapping, surface artifact identification and analysis, and test excavation. Twenty-nine shovel tests and four 1 m x 1 m test units were excavated. The results of field work and laboratory analysis were used to determine that the site does not meet the criteria for eligibility for nomination to the NRHP. No further archeological work is recommended at the site.

Eligibility testing at site 5LA4632 was conducted from September 10 through September 12, 1994. A total of 8.5 person days were spent at the site. Archeological investigations included the production of a site map, field analysis of visible surface artifacts, and the excavation of twenty-one shovel tests and two 1 m x 1 m test units. Flaked lithic and ground stone artifacts were recovered from shovel tests at depths of up to 70 cm below the surface. Twelve of twenty-one shovel tests produced buried artifacts, and both test units indicated a good probability for a buried cultural horizon. A radiocarbon date was obtained on charcoal from this

probable cultural horizon, and it places the occupation of this site during the Late Archaic or Ceramic Periods. Based on the presence of significant numbers of buried artifacts and the possible association with a buried cultural horizon, the site is deemed eligible for nomination to the NRHP under Criterion D: the potential to yield significant information on the lifeways of the prehistoric population of the PCMS.

Site evaluation for the NHRP was conducted at 5LA4854 by Fort Lewis College from August 23 through August 24, 1994. A total of 11 person days were spent at the site. Work completed at the site consisted of EDM mapping, surface reconnaissance, and test excavation. Five shovel tests and four test units were excavated. The results of field work and laboratory analysis were used to determine that the site does not meet the criteria for eiligbility for nomination to te NRHP. No further archeological work is recommended at the site.

Site evaluation for NRHP eligibility began at 5LA5008 on August 26 and was completed on September 12, 1994. A total of 17 person days were spent at the site. Work completed at the site consisted of EDM mapping, surface-artifact identification, and the excavation of thirty-three shovel tests and six test units. Field and laboratory results have demonstrated that the site has the potential to yield significant information about the prehistoric lifeways of the inhabitants of the PCMS. In particular, the site has the potential to yield information about the economic use of the uplands portion of the study area. Therefore, it is recommended that the site be considered eligible for nomination to the NRHP under criterion D: the potential to yield significant information on the lifeways of the prehistoric population of the PCMS.

Site evaluation for NRHP eligibility was conducted by Fort Lewis College at 5LA5360 from September 12 through September 14, 1994. A total of 12 person days were spent at the site. Archeological investigation at the site consisted of EDM mapping, surface artifact identification, field analysis of surface artifacts, and the excavation of four test units. The results of field and laboratory investigations and historical literature review have demonstrated that the site has the potential to yield significant information under Criteria A and D, and that both the prehistoric and historic site components are considered eligible for nomination to the NRHP.

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CHAPTER 1

INTRODUCTION

In 1994, Fort Lewis College (FLC) entered into a cooperative agreement with the National Park Service, Midwest Archeological Center (MWAC), the purpose of which was to conduct archeological testing for National Register eligibility on eight cultural properties within the Pinon Canyon Maneuver Site (PCMS), Las Animas County, southeastern Colorado (Figure 1.1). Because of the high-impact nature of current land use at the PCMS, there is the potential for significant damage to archeological sites. The PCMS is a tank exercise ground for the U.S. Army.

The eight properties, designated as 5LA3347, 5LA3570, 5LA4603, 5LA4606, 5LA4632, 5LA4854, 5LA5008 and 5LA5360, comprise seven prehistoric archeological resources and one prehistoric and historic archeological resource. The properties are located on six quadrangle maps (Table 1.1, Figure 1.2), include sites located in a variety of topographic and environmental zones as described by Schuldenrein et al. (1985) and McFaul and Reider (1990a), and represent several different site types as described in the PCMS archeological overview (Andrefsky 1990a). The intent of site testing was to determine horizontal and vertical site boundaries, and to determine whether each resource satisfied the criteria for a significant archeological resource as outlined in the previously developed prehistoric and historic contexts of southeastern Colorado (Eighmy 1984) and in the current research design proposal for the Pinon Canyon Maneuver Site (Andrefsky 1990). Specifically, determination of the prehistoric sites' ability to contribute significant knowledge of the prehistory of the PCMS was predicated on the following criteria: prehistoric chronology; paleoenvironment; settlement and subsistence; and exchange and mobility. Given the variety in site types of the eight resources (i.e., surface lithic and ground stone scatters, structural remains, exposed hearths, deeply buried cultural deposits), it was anticipated that individual sites would be evaluated according to several of these criteria. Additionally, site 5LA5360, a multiple component historic and prehistoric site, was evaluated according to the above-mentioned criteria for the prehistoric component and also addressed the following historical research concerns: chronology; functional site type; settlement trends; culture change and ethnicity.

The field season consisted of two ten-day sessions, with a crew of seven people. Work began on August 21 and continued to September 15. Field work was conducted in accordance with the existing guidelines and procedures established for the PCMS (Dean 1992) and those of the State of Colorado Historic Preservation Office. The extent of subsurface testing was reviewed by MWAC personnel. This testing did not exceeded the necessary requirements to determine site significance. Laboratory analysis involved the cataloging, curation, and analysis of all collected materials. Procedures followed those defined by Dean (1992).

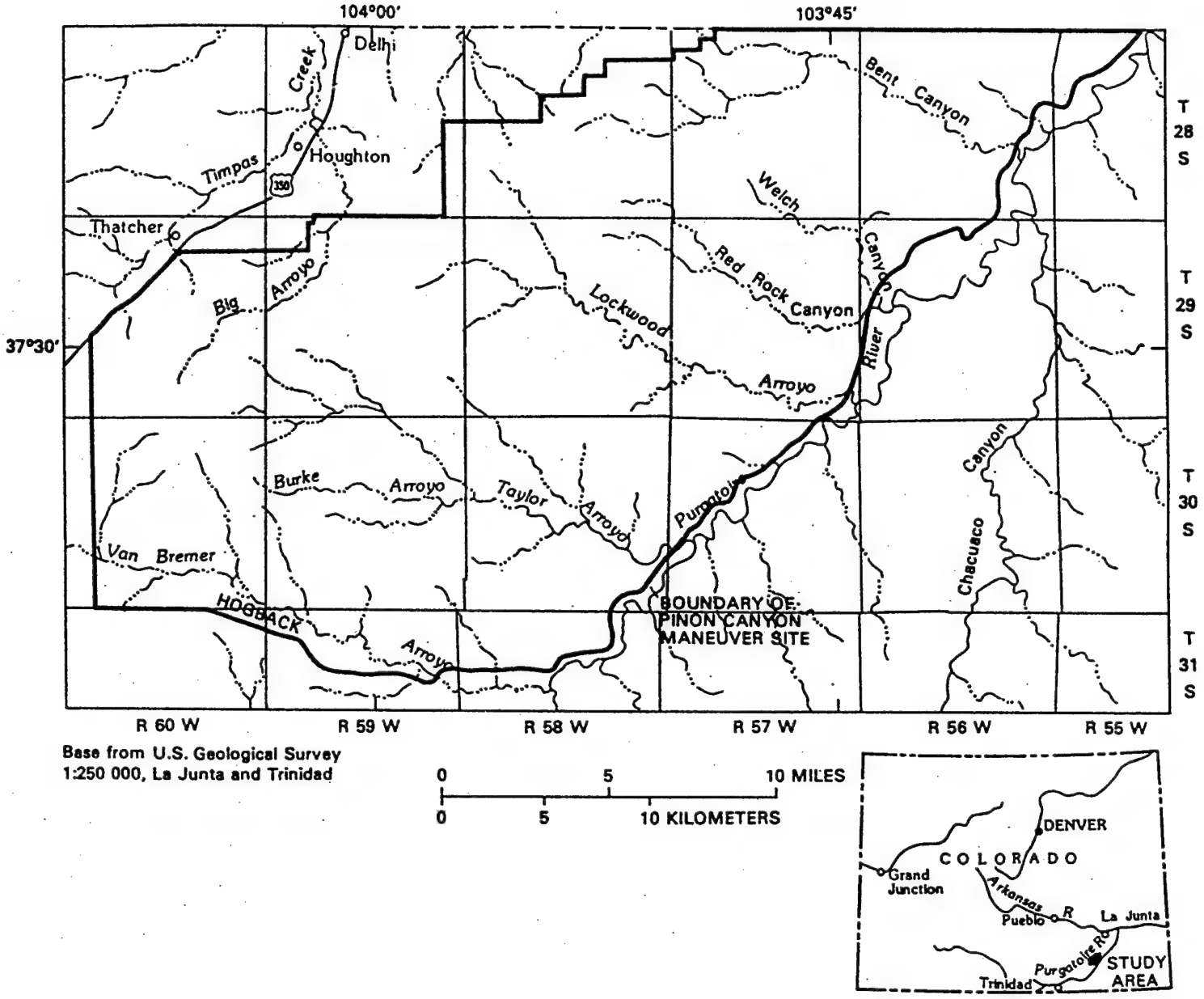

Figure 1.1 General location map of the PCMS, Southeast Colorado. Map taken from von Guerard et al. (1987:3).

Table 1.1 Locational information for sites tested by FLC, PCMS, 1994.

Site No	Training Area	Quadrangle	TN	RG	Section	Elevation (m)
5LA3347	C	Doss Canyon North	30S	58W	23	1530
5LA3570	C	Doss Canyon North	29S	58W	23	1503
5LA4603	E	O V Mesa	28S	56W	11	1433
5LA4606	E	O V Mesa	28S	56W	15 16	1458
5LA4632	E	O V Mesa	28S	56W	22	1445
5LA4854	E	Stage Canyon	29S	58W	2	1527
5LA5008	E	Packers Gap	28S	57W	1	1487
5LA5360	B	Rock Crossing	30S	58W	21	1535

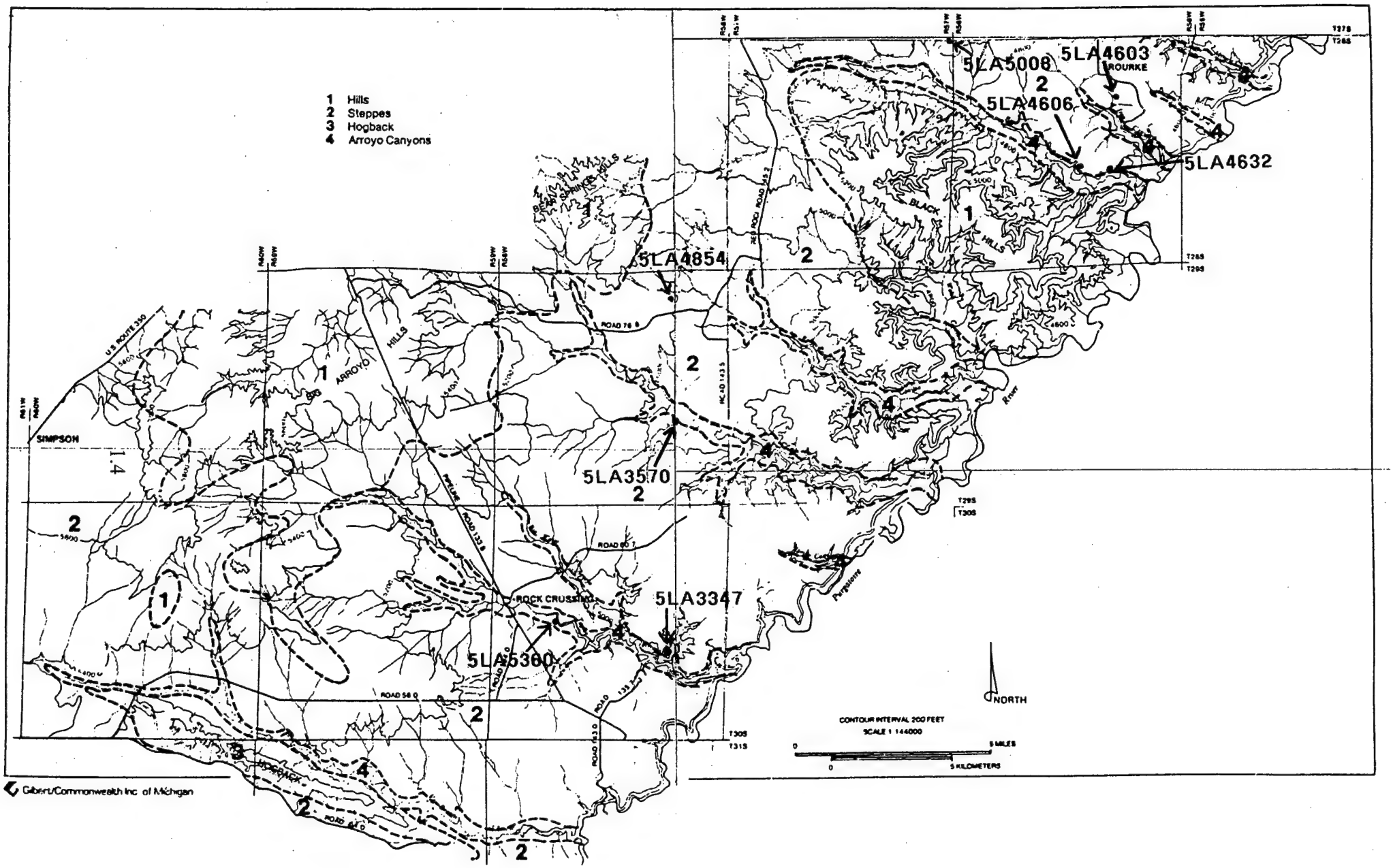

Figure 1.2 Location of cultural resources tested by Fort Lewis in the PCMS. Major Landform Units as defined by Schuldenrein et al. Map taken from Schuldenrein et al. (1985:7).

The public interest was well served by the participation of Fort Lewis College students in this work. Students gained valuable practical experience in all facets of archeological research, and thus this project materially contributed to the educational mission of Fort Lewis College. The resulting addition to the archeological knowledge of this part of the state benefitted the public in that it has helped preserve valuable cultural resources and has increased awareness of the rich prehistoric and historic cultural legacy of the nation in general.

This report documents the findings of this evaluative work. The first five chapters describe the natural and cultural settings of the PCMS, and place this present work into its management context. Each site is then described in detail and the specific evaluative procedures for each site are documented. Management recommendations are presented, as well as four individual appendices pertaining to specific technical analyses. These include radiocarbon dating, pollen analysis, obsidian hydration dating, and a photograph of the previously recorded projectile points.

CHAPTER 2

BACKGROUND TO THE STUDY: THE NATURAL AND CULTURAL ENVIRONMENTS

INTRODUCTION

The Pinon Canyon Maneuver Site is located in the plains of southeastern Colorado, just north of the boundary between the Great Plains proper and the Sonoran zone of the Desert Southwest. The purpose of this chapter is to describe the natural and cultural environments of the maneuver area, so that human adaptations, both prehistoric and historic, can be better understood. The first section provides the reader with a synopsis of the Great Plains in general. The next section deals specifically with the natural environment of the PCMS. The final two sections describe the history and prehistory of the PCMS.

THE GREAT PLAINS OF NORTH AMERICA

Walter Prescott Webb (1931) described the Great Plains as a land of sun, wind, and grass. Covering an area of approximately 450,000 square miles, the Great Plains stretch from the Rocky Mountains in the west to Iowa and Missouri in the east, from southern Canada in the north to Texas in the south (Wedel 1961).

Physiography

Much of the following synopsis is taken from Wedel (1961). The Plains have low relief. Their elevation ranges from a high of 7,000' asl in Wyoming and 5,000' asl in the Colorado foothills to about 2,000' asl in the eastern boundary. Geologically, the Plains are the result of repeated uplifts of the Rockies which started during the Tertiary (65 Ma BP) and extended into the Quaternary (1.8 Ma BP). As the western land increased in elevation, its streams became increasingly active and huge quantities of silt were deposited to the east. This occurred in southern Canada, most of North and South Dakota, Wyoming, and Montana, and as far east as most of Nebraska and Kansas, to central Oklahoma and central Texas. Streams are easterly flowing. Most local water sources are permanent springs and seeps from underground reservoirs such as the Ogalalla Aquifer. There are numerous sand dunes on the Plains, the largest of which are located in central Nebraska north of the Platte River.

Climate

Wind systems are dominated by westerlies. In the central and southern plains, "hot winds" can blow at temperatures over 100^0. In the winter, the southerly movement of the jet stream brings with it the cold Arctic air mass creating cold temperatures. Upper temperature readings decrease and lower readings increase from south to north. Annual temperature means vary from 65^0 F in Texas to 35^0 F in Canada. Extreme summer highs of 110^0 F are found,

however, in both Texas and southeast Alberta. Minimums of -16^0 F are recorded in Texas, and -55^0 F in Canada.

Average annual precipitation on the plains has a high of 40" in southeast Kansas, and lows of 14" in eastern Colorado and New Mexico, with 10" in southeast Alberta and southwest Saskatchewan. There is much local variation due to elevation. For example, the Black Hills of South Dakota have 6-8" more precipitation per year than surrounding areas. Summer precipitation comes mostly in the form of heavy late afternoon thunderstorms that create puddling; therefore, most of the moisture is lost through transvaporation before it can seep into the soil. In the winter, especially in the central and northern plains, heavy winter snowstorms are common.

This climate severely restricts the ability to grow crops. The number of frost-free days in the southern and central plains tend to range between 140-200, whereas in the northern plains, the number drops to below 100. The problem with growing crops is that drought increases as one goes south; cold increases as one goes north.

Flora and Fauna

The dominant grassland biome characteristic of the plains is created by the combination of high evaporation from the constant winds and low precipitation. Fire (both natural and human caused) also was a factor, as was the action of ungulate grazing; the importance of these are debated still (Arthur 1975).

Two major grass types exist on the plains: shortgrasses and tallgrasses. Shortgrasses are characterized by short stems and roots, and quick growth with little moisture. They hold their nutritional content through the dormant winter period and therefore provide good winter forage. The tall grasses have long stems and roots (up to 6' for each). They are found in areas of higher precipitation such as along foothills and the eastern margins.

The dominant fauna of the plains was the American bison (Bison bison bison), until massive EuroAmerican settlement in the 19th century drove the animal almost to extinction. It provided aboriginal groups with food, materials for clothing, utensils, glue, bindings, and tipi covers. Although their migratory behavior was formerly denied (Roe 1951), it is now fairly widely accepted that herds engaged in small-scale, localized migrations (McHugh 1958). Other animals native to the Plains included the antelope, deer, wolf, kit-fox, jackrabbit, Plains grizzly, various birds, fish, and shellfish (primarily mussel).

Paleoenvironments

Two models for paleoenvironments in North America are available. The first, proposed by Antevs (1955), envisages climatic change as slow and gradual. Consequently, he defined only three major climatic episodes for the Holocene (or Neothermal, in his nomenclature): (1) Anathermal (10,150-7,000 BP); (2) Altithermal (7,000-4,500 BP.); (3) Medithermal (4,500 BP-present).

This model has been augmented by one based on the European Blytt-Sernander model of short periods of climatic stability interrupted by rapid change to new stable states (Wendland and Bryson 1974, Wendland 1978): (1) Late Glacial - 13,000-10,030 BP; (2) Pre-Boreal - 10,030-9,300 BP; (3) Boreal - 9,300-8,490 BP; (4) Atlantic - 8,490-5,060 BP; (5) Sub-Boreal - 5,060-2,760 BP; (6) Sub-Atlantic - 2,760-1,680 BP; (7) Scandic - 1,680-1,260 BP; (8) Neo-Atlantic - 1260-850 BP; (9) Pacific - 850-400 BP; (10) Neoboreal (Little Ice Age) - 400-100 BP; (11) Recent - 100 BP - present (dates taken from Wendland 1978). There is, however, much regional variation in the dating and severity of these episodes because of their transgressive nature (Wilson 1988), and, therefore, local studies are necessary for any intensive study of human-environment relationships.

THE NATURAL ENVIRONMENT OF THE PINON CANYON MANEUVER SITE

Physiography

The PCMS comprises approximately 243,000 acres (380 square miles) of rugged country in Las Animas County, southeastern Colorado. It is located at the edge of the plains grasslands and is close to two other major physiographic regions: (1) the Rocky Mountains, specifically the Sangre de Cristo Range to the west and the Raton Mesa uplift to the south; and (2) the American Desert Southwest (Weber 1990: XVII-2). The PCMS is comprised of four major landscape units: Hills; Steppes; Hogback; and Arroyo/Canyon (Schuldenrein et al. 1985).

Geology and Geomorphology

A generalized description of the geology and geologic structures from the PCMS is extracted from several major sources. These sources include the geologic and structure contour map of the La Junta Quadrangle (Scott 1968), and the geologic map of the Trinidad Quadrangle (Johnson 1969). Detailed information on the local geology was obtained from two principal sources: a report of the hydrology of the PCMS by the U.S. Geological Survey (von Guerard et al. 1987), and the geomorphological and geoarcheological investigations of the PCMS (Schuldenrein et al. 1985). These documents were of value for their descriptions of the local geophysical environment, and two maps and one table were selected from these reports for inclusion in the following discussion.

Lithology A generalized chart of the geologic stratigraphy is presented in Table 2.1, and a map showing the major lithologic units is provided as Figure 2.1. The oldest formations identified in the PCMS are of Permian, Triassic, and Jurassic Ages, and they are exposed only in the deeply dissected canyons and along the Purgatoire River Valley. These rocks consist of sandstones of the Entrada Formation, an ancient dune deposit, limestones and claystone of the Ralston Creek Formation, and the vari-colored claystones and limestones of the Morrison Formation. The Morrison Formation is Jurassic in age and was deposited on an expansive floodplain that was built up by streams carrying clastic sediments off the mountains to the west during the Nevadan Orogeny.

Table 2.1 Generalized geologic chart, PCMS. Taken from von Guerard et al. (1987:11).

System	Series	Formation	Member	Approximate thickness (m)	Physical Description
Quaternary	Holocene	Alluvium		Variable	Gray, poorly sorted stony sand and silt forming flood plain
	Pleistocene	Dune sand		Variable	Yellow, fine-grained sand, forming localized dunes
Tertiary	Oligocene and Eocene	Basic plugs, dikes, and sills			Dark gray, finely crystalline, olivine, basalt dikes
Cretaceous	Upper Cretaceous	Niobrara	Smoky Hill Shale Member	Variable	Yellowish-gray, fossiliferous, calcareous shale and silty limestone
			Fort Hays Limestone Member	15 - 18	Beds of chalk .15 to 1 m thick separated by beds of dark-gray chalky shale 2.5 52 cm thick
		Carlile Shale	Codell Sandstone Member	1.5 - 7	Upper part is thin lenses of dark limestone interbedded with a limey shale. Basal .75 to 1 m is a dense, near-black, fossiliferous limestone
			Blue Hill Shale Member	20 - 25	Dark fissile shale with large calcareous concretions
			Fairport Chalk Member		Tan to black, chalky, calcerous shale
		Greenhorn Limestone	Bridge Creek Limestone Member	9 - 12	Interbedded, fossiliferous limestone and limey shale
			Hartland Shale Member	7 - 9	Light gray limey shale with thin beds of Bentonite
			Lincoln Limestone Member	4.5 - 9	Limey shale with platy limestone beds near base and top
		Graneros Shale		27 - 45.5	Dark gray to black, fissile, noncalcareous shale, with two beds of dense, dark limestone
	Lower Cretaceous	Dakota Sandstone		22.5 - 42.5	Yellowish brown, crossbedded cliff-forming sandstone
		Purgatoire Formation	Kiowa Shale Member	12 - 21	Fossiliferous, marine, dark-gray, claystone, siltstone and sandstone
			Cheyenne Sandstone Member	21 - 33.5	Massive white to yellowish brown, crossbedded sandstone
Jurassic	Upper Jurassic	Morrison Sandstone		30.5 - 91.5	Varicolored claystone, brown weathering sandstone and gray sandstone
		Ralston Creek Formation		6 - 15	Greenish gray claystone, gray limestone with jasper and agate
		Entrada Sandstone		6 - 30	Massive, white crossbedded sandstone
Triassic and Permian		Undivided			Mostly reddish brown sandstone and shale with dolomite and limestone

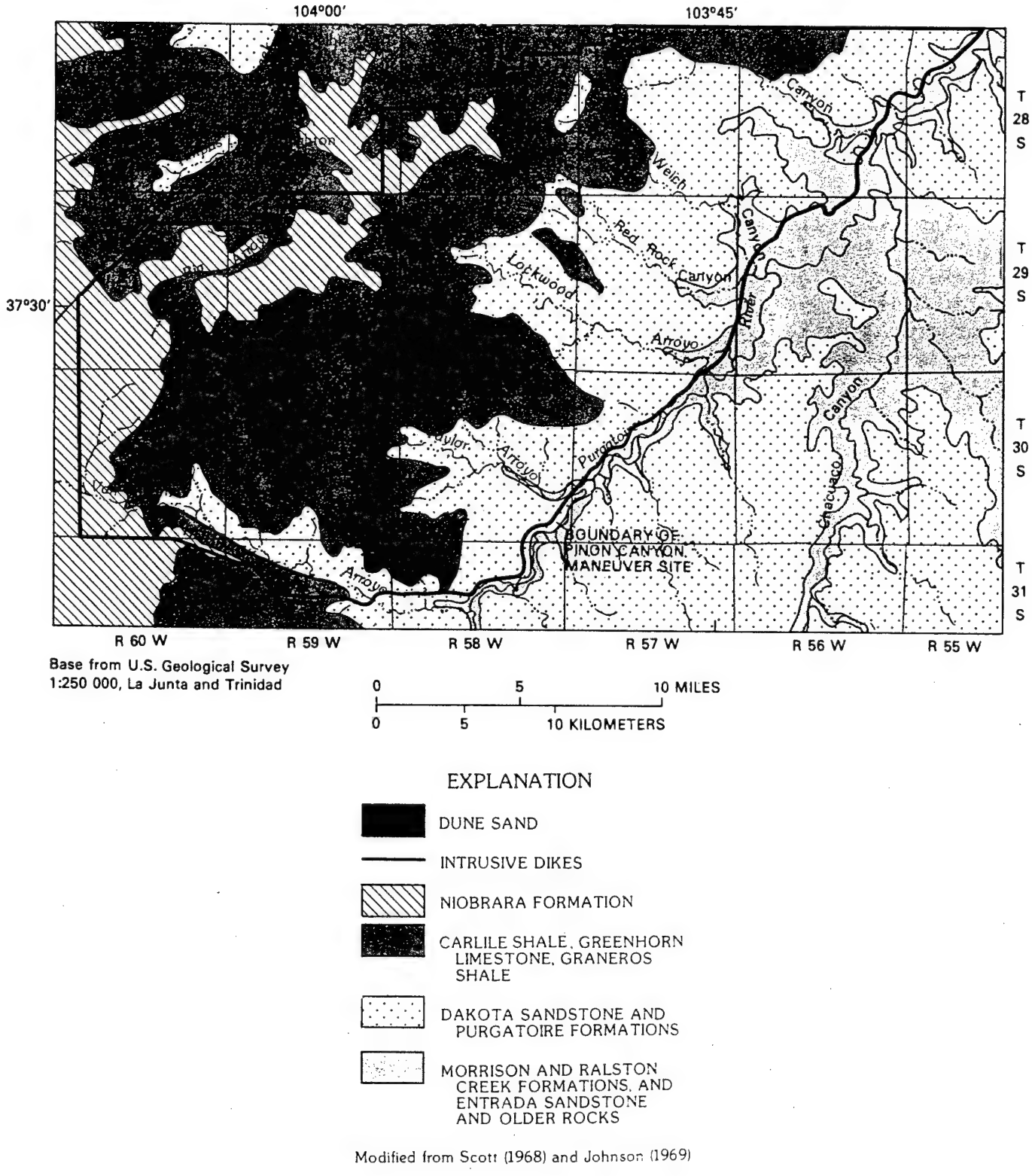

Figure 2.1 General geologic map of the PCMS. Map taken from von Guerard et al. (1987:10).

The Lower Cretaceous Dakota Sandstone and Purgatoire Formations outcrop over a large portion of the PCMS. The Purgatoire Formation consists of two members - Cheyenne Sandstone and Kiowa Shale. Cheyenne Sandstone is a white to yellowish brown, cross-bedded, massive sandstone. It ranges from 40 ft to 70 ft thick. It is exposed as white cliffs along the Purgatoire River. It is distinguished from the Dakota Sandstone by its whiter color and more rounded weathered form. The Kiowa Shale is a fossiliferous, marine, dark-gray claystone. This is locally exposed in the deeper reaches of the Purgatoire River Canyon.

The Purgatoire Formation is overlain by the Dakota Sandstone. This sandstone is a yellowish brown, cross-bedded sandstone that has weathered into steep ledges and cliffs that form the rim of the Purgatoire River canyon and many of the other canyon rims (von Guerard et al. 1987:9). Surface exposures are often coated with manganese oxides or desert varnish. The Dakota Sandstone was laid down during a regression of the Cretaceous seas. It is a beach facies and often contains hard, dark-brown ironstones. Some exposures also contain chert and chalcedony pebbles. The formation ranges between 22 m and 45 m thick. In particular, the Dakota Sandstone outcrops along most of the canyon rims and underlies the shallow soils over most of the entire PCMS.

Overlying the Dakota Sandstone and Purgatoire Formation and comprising the major rock of the western and northern sections of the PCMS are the light to dark gray, noncalcareous shales and fossiliferous limestones of the Upper Cretaceous. These include the Carlile Shale, Greenhorn Limestone, and Graneros Shale. These formations were deposited during transgressions of the Cretaceous seas about 100 million years ago. These formations consist of several members (Table 2.1). These sediments were laid down in deeper waters as the Cretaceous seas continued to advance north and east across the continent. The Late Cretaceous, Niobrara Formation outcrops along the highest ridges in the northwestern part of the PCMS. Comprised of two members, the formation consists of beds of chalk separated by beds of dark-gray chalky shale and overlying yellow-gray, fossiliferous calcareous shale and silty limestone.

The most recent lithology in the PCMS are the two eastward trending dikes. The larger of the two is the Hogback. The Hogback is located at the extreme southeastern boundary of the PCMS. A smaller dike is located west of the Hogback. Both dikes are composed of dense, dark, olivine basalt (Scott 1968).

Geomorphology The PCMS is divided into four major landscape units: Hills, Steppes, Hogback, and Arroyo/Canyon (Schuldenrein et al. 1985). The Hills landscape unit consists of the Black Hills, the Big Arroyo Hills, and the Bear Spring Hills. This landscape unit contains more varied terrain than any other unit with steep slopes, pediments, and heavily dissected hill slopes. The Steppe landscape unit is the level to slightly sloping grasslands and mixed pinyon and juniper forest that covers most of the PCMS. The Hogback, a basaltic dike, is bounded by the Van Bremer Arroyo and its tributaries and is shaped by erosional activity on a steeply tilted cuesta. The Arroyo/Canyon landscape unit includes the slopes and bottoms of the major drainages in the PCMS.

The above landscape units are subdivided further into eight landform categories (Schuldenrein et al. 1985:70). These categories include:

1. heavily eroded, stripped steppes and very steep slopes;
2. broad steppes;
3. graded pediments or gently sloping steppes;
4 alluvial fills and terraces;
5. the Hogback and its steep slopes;
6. the loessic plains at the western edge of the PCMS;
7. the sandy terrains below the Big Arroyo Hills, and;
8. escarpments and cliffs.

Bedrock Structure The prevalent structural pattern for the region as a whole and including the PCMS is the gently dipping, subhorizontal, sedimentary bedrock pitch at the western edge of an east - west axis. Exceptions to this major structural feature in the PCMS include the Black Hills double monocline and the Hogback dike.

Hydrology The PCMS is drained principally by the Purgatoire River which flows along the eastern edge of the maneuver area. Five main arroyo systems and numerous smaller systems are present in the PCMS. The five major systems from south to north are Van Bremer, Taylor, Lockwood, Red Rocks and Bent Canyons. Like most drainage patterns, the local pattern is directly tied to the underlying bedrock structure. The fracture or joint lineaments, of which there are two major lineaments, are oriented north to northwest. The fracture joints have important implications for the area's archeology because they are sources of groundwater entrapment, springs, and rock shelters.

Soils There is limited soil development across the PCMS - the product of prevalent long-term aridity. Two major soil orders are present in the PCMS (Figure 2.2). These are the loessic Entisols in the dunes east of Simpson along the western edge, and the Aridisols which cover most of the PCMS. Both soil orders possess weak Soil "A" horizons and clay enriched Soil "B" horizons. Two aridisols occur in the project area and were mapped by the United States Soil Conservation Service. The Penrose-Manzanola-Midway soil type is typically found on the shale bedrock toward the northern end of the PCMS. This soil profile exhibits a shallow, weak "A" horizon with little organic matter overlying an even weaker "B" horizon. These soils are usually as old as the alluvial fills of the arroyo. They may represent most of the Upper Quaternary. A second soil, Travessilla-Wiley-Villagreen, is formed over sandstone bedrock, and covers most of the project area. Based on soil development, geomorphologic position, and radiocarbon dating, the PCMS experienced periods of eolian deposition in the late Pleistocene and Altithermal, and at least four periods of alluvial deposition, one pre-9080 B.C. and three after (McFaul and Reider 1990a: III-20).

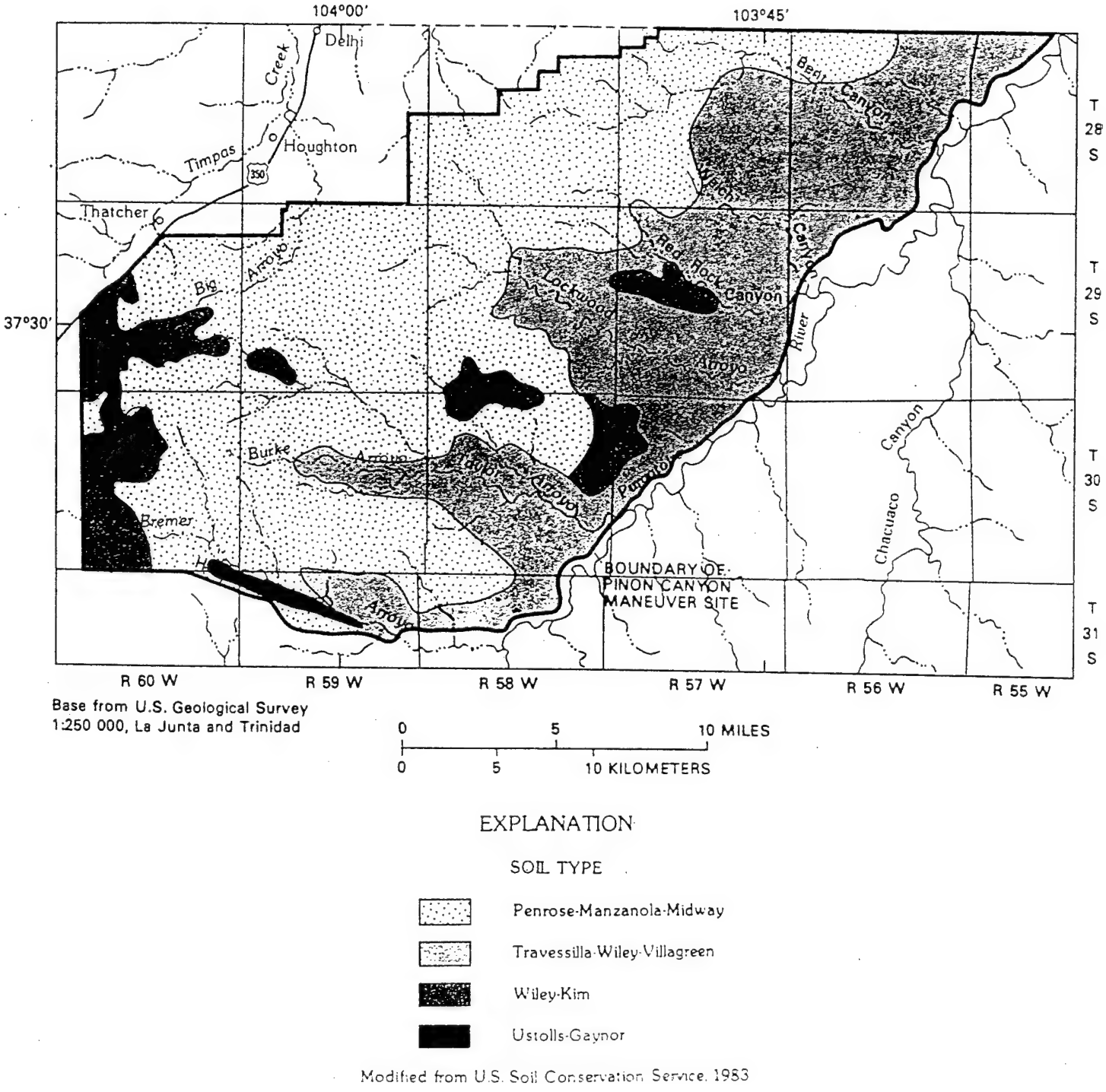

Figure 2.2 General soils map for PCMS. Map taken from von Guerard et al. (1987:8).

Climate

The climate of the PCMS is classified as a cold middle latitude steppe climate (McFaul and Reider 1990b: II-3). January is the coldest month, with an average of -1.4 C at Rocky Ford, 75 km northeast of the PCMS (McFaul and Reider 1990b: II-3). Winter temperatures are ameliorated by sporadic winter chinooks. Precipitation averages 292 mm at Rocky Ford, with May being the wettest month (McFaul and Reider 1990b: II-3).

Flora and Fauna

A total of 350 plant species have been identified in the PCMS. These are organized into four grassland communities, sixteen shrubland communities, and six woodland communities (Van Ness and Kalasz 1990: II-14). These provided a very wide range of resources both for consumption and other purposes (Van Ness and Kalasz 1990: II-30-41). A similarly wide variety of fauna are identified in the PCMS. Large ungulates include mule deer, pronghorn antelope, and Bighorn sheep. Prior to EuroAmerican occupation, the American Bison roamed across what is now the PCMS, although the exact size of these herds in the Central and Southern Plains is disputed (Huebner 1991).

THE CULTURAL SETTING

The purpose of this section is to place the Fort Lewis College work in its research and management. It is not intended to serve as a redundant reworking of the comprehensive syntheses of PCMS archeology that have been produced in the last decade. Readers are encouraged to refer to these syntheses, which are noted below, for detailed information on the archeology of the PCMS, as well as to Athearn's (1985) excellent historical review of southeastern Colorado.

Plains Archeology

The archeology of the PCMS, for obvious reasons, cannot be separated from Plains archeology. Historical overviews of the development of the latter are found in Frison (1973), Wedel (1983), and Duke and Wilson (1995a). The following section draws heavily from these three works, as well as from others that are referenced as appropriate.

Plains archeology was a relatively late entry into American anthropology, probably for two reasons. First, it lacked the monumental structures which had attracted early students to places like the Southwest. Secondly, influential early anthropologists, from Wissler to Kroeber, had declared the region uninhabitable prior to the acquisition of the horse (Frison 1973: 151).

Throughout the 1920s, some archeologists began working in the Plains. However, there was still no systematic investigation or excavation, and some strange theories still prevailed: for example, the Welsh influence among the Mandan of the Middle Missouri region (Frison 1973). This attitude changed as a result of the number of early human finds found in the area, which put plains archeology in the forefront of this study in the 1930s. Sites like Lindenmeier and Dent in Colorado, together with Clovis and Folsom in New Mexico, were discovered in this decade. Also, during this decade, theoretical contributions from Strong, Wedel, and Krieger helped Plains

archeology gain a national stature (Duke and Wilson 1995a: 3). Plains archeology, for a while, became a "high-status" area of study.

The second boost to Plains archeology came as a result of the threatened loss of thousands of archeological sites in the Missouri River floodplain through reservoir construction for recreation, storage, and hydroelectric facilities. Mitigation surveys began in 1946 under the direction of the Smithsonian Institution. Field headquarters were located at the University of Nebraska. The final survey was completed in 1968, and massive data banks were produced. Plains archeology became for a critical part of its life dominated by salvage archeology concerns (Lehmer 1971; Frison 1973). Government involvement in plains archeology received a further boost in the 1960s with the modern era of cultural resource management. However, because large portions of the plains are privately owned and therefore not under the jurisdiction of federal conservation laws, archeological studies of large areas like the PCMS take on additional importance.

It is true to say that Plains archeology has been dominated by the practical necessities of dating sites and erecting spatio-temporal frameworks (Duke and Wilson 1995a). Despite the early important theoretical contributions of Plains archeologists like William Duncan Strong (1935) and Waldo Wedel (1936), Plains archeology has never flirted with archeological theory for its own sake. Nevertheless, elements of processualism have become important mainstays of much contemporary Plains archeology, whether it be Ahler (1970), Calabrese (1972), Johnson (1988), Bamforth (1988), or Kelly and Todd (1988). Even postprocessual studies have made their way onto the Plains (Duke and Wilson 1995b). Nevertheless, these studies all seem to have been driven by the primary need to understand the prehistory of the Plains, rather than using the Plains merely as a testing ground for proposed theoretical contributions to the discipline at large.

Southeastern Colorado Archeology

The purpose of this section is not to repeat the well documented syntheses provided by Eighmy (1984), Cassells (1983), and Anderson (1990) for southeastern Colorado. However, it is necessary to "set the scene" as it were, so that the specific resources discussed and evaluated in this report may be better understood.

The cultural taxonomies and classifications used in southeastern Colorado are an implicit amalgamation of taxonomic systems proposed by McKern (1939) and Willey and Phillips (1958). Thus, we note the interchange of McKern's "focus" and Willey and Phillips's "phase" concepts throughout much Plains archeological writing (see also Chomko et al. 1990: 9). The terms stage and period have also become virtually synonymous. This confusion is particularly apparent in discussion of the Archaic - a confusion fueled by the use of the term "Archaic" by Frison (1978) for the Middle Prehistoric Period. While this interchange is acceptable for Wyoming, where the Altithermal of the early Middle Prehistoric Period created the need for Archaic-stage adaptations, it is less applicable elsewhere in the northern Plains, where a commitment to large animal hunting may have continued unabated, despite the stress caused by Altithermal climatic deterioration.

It is fair to say that the processes behind the patterns that constitute the culture-historical sequences of southeastern Colorado are still essentially unknown. For example, although lengthy discussions on the (dis)similarities between projectile points and other diagnostic materials have been made by numerous workers (e.g. Gunnerson 1987), there has been less discussion on whether these patterns are the result of migration, diffusion, or other cultural factors. Projectile point styles seem to constitute distinct horizon styles that cross-cut other cultural boundaries, and it is clear that an adequate understanding of the area's prehistory cannot be completed until these factors have been evaluated.

The Pinon Canyon Maneuver Site is part of the Southeast Colorado Cultural Unit defined by Eighmy (1984). Eighmy (1984: 10) divides the chronology of this unit into four periods: Paleo Indian; Archaic; Ceramic; and Protohistoric/Historic.

The Paleo Indian Period The Paleo Indian Period is a well-documented phenomenon in eastern Colorado, the area producing some of the more significant finds of that period (Dent, Cattleguard, Lindenmeier, Olson-Chubbuck). It is typified by nomadic hunters and gatherers, concentrating on the killing of large fauna, such as mammoth, now-extinct forms of bison, and other late Pleistocene megafauna.

The presence of humans in southeastern Colorado during the Paleo Indian period is evidenced primarily by surface finds (there are two Folsom finds on the Chaquaqua Plateau [Campbell 1976], for example). However, this area is relatively close to the Folsom type-site, located just southeast of Raton, New Mexico. The bison-kill site of Olson-Chubbuck (Wheat 1972) is also relatively close. It is likely that more Paleo Indian sites will be found in the future.

Archaic Period The Archaic Period, which begins about 5500 B.C., is represented more in southeastern Colorado. It is typified at the continental level by a switch to a wider spectrum of hunting and gathering, an increase in the use of ground stone tools used in plant preparation, and - at the end of the period at least - greater sedentism, which perhaps is a precursor to a dependence on cultivated plants.

Although few sites in southeast Colorado are dated to the Early Archaic (5500-3000 B.C.), Eighmy (1984:68) notes several components typologically similar to this period in the John Martin Reservoir, located in southeastern Colorado. The Middle Archaic (3000-1000 B.C.) is represented by both radiocarbon and typologically dated components. Point types seem to bear resemblance to Southern Plains and Greater Southwest types (including the Picosa Culture).

Archeological evidence for the Late Archaic (1000 B.C. - A.D. 1) is provided by a series of sites - including stratified rock shelters - such as Carrizo, Medina, Trinchera, and McEndree Ranch. Trinchera Cave provides not only stratigraphic sequences, but also organic material and bones that indicate an emphasis on small-game hunting (Wood-Simpson 1976: 177).

The Archaic Period also provides enough information for the reconstruction of settlement system: for example, Alexander et al.'s (1982) study of the archeology of the Fort Carson

Military Reservation, Lutz and Hunt's (1979) of the Purgatoire and Apishapa highlands, and Eddy's et al's (1982) of the John Martin reservoir area.

The Ceramic Period The Ceramic Period, according to Eighmy (1984), is not fully formative, because it is still primarily based on hunting and gathering, and it lacks established village life. Eighmy divides this period into an Early and Middle.

The former, which dates A.D. 1-1000, comprises the Graneros and Parker Foci (or phases, depending on the nomenclature preferred). The Graneros Focus (Withers 1954) is characterized by cord-marked pottery, corner-notched projectile points and slab-constructed circular dwellings. It is found primarily along the Arkansas River system. The Parker Focus, which might be merely a geographical variant of Graneros (Butler 1986: 213) - or vice-versa - is heaviest in the Denver Basin and South Platte valley region, and may extend to the San Luis Valley.

The Middle Ceramic Period (A.D. 1000-1500) includes the Upper Republican, Upper Purgatoire, and Apishapa Phases. The Upper Republican (A.D. 1000-1450) is characterized as a sedentary culture based on hunting and gathering and horticulture (Gunnerson 1987: 68-71). It is located primarily in southern Nebraska and northern Kansas. The phase was associated with the prehistoric Pawnee by Strong (1935). The Upper Purgatoire Phase is dated to A.D. 1075-1225 (Wood and Bair 1980:15). Subsistence during this time was a mixture of foraging and farming, and its ceramic styles reflect both Plains and Southwest influences. The Apishapa Phase is a major occupational presence in the PCMS. This phase was first studied by Renaud (1931). It is characterized by villages, of varying size, composed of upright stone slab houses, often in defensible locations. The proximity of these sites to arable land (Campbell 1969: 418-419) suggests a commitment, of unknown intensity, to horticulture. Ireland (1968) proposed that at the Snake Blakeslee site (Gunnerson 1989), occupants subsisted on corn and bison.

The Protohistoric/Historic Period The Protohistoric/Historic Period (A.D. 1551-1750), which belongs to Gunnerson's (1987: 97) Late Ceramic Period, is characterized by a number of tribes who were either hunters and gatherers or part-time horticulturalists. They also adopted the horse. One of the major Colorado Plains groups were the Protohistoric Athabascans. They grew corn, beans and pumpkins, and traded extensively with Puebloan groups in northern New Mexico. In the Park Plateau area of southeastern Colorado, this Athabascan (specifically Apachean) occupation is called the Carlana Focus. It has no cultural ties to the antecedent Sopris Focus. The Dismal River Aspect (A.D. 1675-1725) is found throughout large portions of the western plains including eastern Colorado (Gunnerson 1987: 102-107). A mix of farming and large-game hunting, it is thought to represent ancestral Apachean groups, who migrated south as part of the large Athabascan movement that began in Alaska sometime in the first millennium (Duke and Wilson 1994; Vickers 1994).

THE ARCHEOLOGY OF THE PINON CANYON MANEUVER SITE

The PCMS covers approximately 236,000 acres). Of these, a total of 75,477 acres have been archeologically surveyed. A total of 2,759 sites and isolated finds have been located.

These site include prehistoric sites, historic sites, sites that date to both periods, sites of undeterminable cultural affiliation, and isolated finds. The PCMS shows evidence of human occupation or utilization since 10,500 years ago. Dated prehistoric remains fall mainly into the period A.D. 200-1400. Major historic period occupation began after the Civil War and intensified until the 1930s.

Of great interest is the quantity of rock art in the PCMS (Zier 1990; Loendorf and Kuehn 1991), both aboriginal and historic EuroAmerican. Panels are both carved and painted, representational (human and animal) and abstract. Many of the rock art sites are close to the basaltic Hogback area and are found not only on rock faces but also on individual boulders scattered throughout the adjacent plains. The sites are difficult both to date and to assign to specific ethnic groups.

Utilizing previous work conducted in surrounding areas, Anderson (1990, 1989), as part of the Larson-Tibesar synthesis, divided the prehistoric material of the PCMS into four stages, nine periods and several phases or complexes within the periods. The reader is asked to note Anderson's use of stage for what Eighmy (1984) terms periods. For the sake of internal consistency, we have adopted Anderson's PCMS nomenclature:

STAGE	**PERIOD**	**PHASE/COMPLEX**
Pre-Projectile	None	None
Paleo-Indian	Clovis (10,500-9,000 B.C.)	
	Folsom (9000-8200 B.C.)	
	Plano (8200-5500 B.C.)	Agate Basin
		Hell Gap
		Cody
Archaic	Early (5500-3000 B.C.)	
	Middle (3000-1000 B.C.)	McKean
	Late (1000 B.C.-A.D. 200)	
Ceramic	Early (A.D. 200-1000)	Graneros
		Hogback
		Parker
	Middle (A.D. 1000-1550)	Apishapa
		Upper Republican
		Upper Purgatoire
	Late (A.D. 1550-1750)	Dismal River
		Undefined complexes

The Paleo Indian stage is manifested on the PCMS by a fragment of a Folsom point (Chomko 1996: personal communication), as well as some Plano materials (Andrefsky and Zier 1990: VIII-3). The scarcity of Paleo Indian sites is a reflection not only of low population densities at that time, but also of local geomorphological processes that have tended to obscure or erode early Holocene deposits. The Archaic stage is similarly under-represented, and this, as is

the case for the Paleo Indian Period, is probably due to both population densities and geomorphological factors (cf. McFaul and Reider [1990a]).

The Ceramic stage (A.D. 200-1750) is characterized by the introduction of cord-marked pottery and the bow-and-arrow. The period A.D. 200-1400 is the heaviest period of occupation in the PCMS (based at least on site numbers). Artifact assemblages suggest continuity with the preceding Archaic (Andrefsky and Zier 1990:VIII-3) in terms of material culture and basic life styles. The Apishapa Phase of the Middle Ceramic Stage is a heavily represented cultural component on the PCMS. A recent review by Chomko et al. (1990:14) sees significant differences between PCMS Apishapa sites and "classic" sites to the north. The latter are characterized by side-notched points and cord-marked ceramics, whereas Apishapa sites on the PCMS tend to have corner-notched varieties and a marked absence of ceramics. The PCMS sites that are located on canyon rims have evidence of stone defensive alignments. They also tend to be earlier; dates cluster at A.D. 1000 compared to A.D. 1300 (clusterings which coincide roughly with the change from Prairie Side-Notched [in fact, a corner-notched variant] to Plains Side-Notched (a true side-notched), as defined by Kehoe (1966). It is, however, too early to designate the PCMS Apishapa as a distinct phase or sub-phase.

The protohistoric period is represented in occupations probably assignable to Apachean and Shoshonean groups (Andrefsky and Zier 1990:VIII-4), although the evidence is meager and subject to the severe theoretical and methodological problems of assigning ethnic affiliation to material assemblages (Duke 1991).

The prehistoric research design established for the PCMS by Andrefsky and Zier (1990) is based on four traditional research approaches. The first is the question of evolution versus adaptation, as defined by Michlovic (1986). According to this model, prehistoric groups on the plains did not evolve in the sense that they made directional and immutable changes to their cultural systems. Rather, they made slight adaptive responses to environmental fluctuations. The underlying theme of this particular approach is that change - for example, the adoption of pottery - is so obviously beneficial that no "underlying causal mechanism" needs to be sought. According to Michlovic (1986) and Andrefsky and Zier (1990), diffusion can be re-adopted as adequate explanation for some observed changes in the archeological record. However, the model still leaves unanswered the reason for the adoption of particular traits by societies who had, presumably, been successful in their lifestyle for centuries before those traits became available (cf. Duke 1991). As such, the model remains merely a statement of a truism - people change because they want to.

The second element is a reliance on general systems theory, which as used in archeology is essentially 1930s-style functionalism. This model tends to downplay the importance of internal causes of socio-cultural change in favor of external ones, in particular the environment. The third element to the research design is the assumption of a close correlation between food shortages and archeologically visible changes in the socio-cultural system, particularly settlement patterns and site sizes. The final element is the assumption that through site location hunter-gatherers will try to optimize their behavior in order to minimize effort and maximize resource procurement. The general location of sites in terms of access to specific sites is then refined to

specific micro-locations through such factors as shelter, aspect and drainage (Duke 1978; Jochim 1976). The degree of sedentism at a particular site can be determined archeologically by such features as the complexity of architecture, the stability of the surrounding resource base, and its ability to be defended.

Utilizing these assumptions, Andrefsy and Zier (1990:VIII-9-13) provided a preliminary settlement model for the PCMS. Sensibly passing over the Paleo Indian stage, because of inadequate data, they propose that during the Archaic human populations either dispersed or congregated, depending on the seasonal availability of resources, both food and non-food (large winter encampments along the main river valleys would be followed by smaller summer expeditions that went as far as the Rocky Mountains to the west.) This is similar to an earlier model proposed by Guthrie (1984) that is based on Binford's (1980) collector-foraging model. Large residential base camps are located along the canyons, where evidence for manufacturing and maintenance activities, together with natural shelter, suggests some degree of seasonal sedentism. Smaller field camps in the steppes and hills served as specialized resource procurement stations. Guthrie (1984) concluded that a complete seasonal round was supportable in the PCMS.

The changes during the Ceramic stage, in terms of greater sedentism and access to cultigens, caused an adaptive shift in seasonal movements, especially in terms of the switch to winter encampments in ecologically diverse canyons, rather than along the major river valleys. Environmental degradation due to severe drought that occurred after A.D. 1000 produced an increase in the number of sites along the east side of the Purgatoire River, perhaps in response to water availability. Increased aridity produced an abandonment of the PCMS by A.D. 1450, and after that period, human utilization of the area was more sporadic.

THE ETHNOHISTORY AND HISTORY OF THE PINON CANYON MANEUVER SITE

There are very few ethnohistorical data for the actual PCMS (Stoffle et al. 1984), and so inferences must be made from those of surrounding areas. From the initial period of European contact, which began in the middle of the 16th century, Plains Indians underwent profound cultural, social and economic changes, descriptions of which need not be replicated here. Initial contact was indirect, in the form of long-distance trade (beaver/muskrat pelts for numerous European goods), but was replaced by face-to-face contact. Beaver trapping (and later bison hide tanning) brought the Plains into the world economic system (cf. Lewis [1942] for an early and surgical analysis of the economic and social effects of this on Northern Plains groups, particularly the Blackfoot). Acquisition of the horse and gun allowed Indian groups to resist European expansion, but more often than not this was done by taking over the territories of Indian groups who were not so well equipped. The horse itself also caused major economic and social changes, which are well documented by Roe (1955). In general, the period of European contact, then, can be seen as one in which Indian groups were forced to become much more mobile and to cope as best they could with the European economic nexus into which they had been unwillingly drawn.

Southern Plains groups made contact with Spanish groups beginning in 1541, when Coronado led an expedition across parts of New Mexico and Kansas (Hammond and Rey 1940). Coronado's account of the groups he met provides a good description of peoples who were still essentially "prehistoric." Coronado encountered two groups called "Querechos" and "Teyas", although there is dispute as to whether both were plains Athabaskans (Apaches) or Apache and Caddoan groups respectively (cf. Weber 1990: XVII-5-6).

Beginning in the late 17th century, the Apache, mounted and heavily armed, became a dominant force on the Southern Plains, raiding for both horses and slaves that were then traded to the Spanish (Weber 1990: XVII-7). Despite the unstable relations between Apache and Pueblo groups, it was, nevertheless, the former to whom the latter fled after a series of revolts (the biggest revolt against Spanish rule started in 1680 and lasted for 12 years). In the early part of the 17th century, the Taos and Jemez Pueblos revolted and established a new settlement called El Cartelejo in western Kansas, which was under the control of the Apaches. It is unclear whether El Cartelejo was a specific pueblo or a region, however (cf. Forbes 1960; Schroeder 1974). By the 1660s the Spanish had moved the Puebloans back to their original settlements (Forbes 1960: 137-139), although the area continued to act as a refugium for Puebloan and Apache groups trying to escape Spanish domination. Weber (1990: XVII-9) points out that this fact sheds light on PCMS ethnohistory, in that: (1) it establishes the Apache very near to the PCMS, if not actually in it; (2) it indicates the probability of social and/or economic ties between the Apache and Puebloan groups; and (3) the PCMS would have been situated precisely between any of the movements between the two groups. During the 18th century, however, the Apaches lost both power and territory as the Comanche expanded, as eastern groups like the Kansa, Oto, Iowa, Ponca and Omaha moved west, and as the area became a geopolitical arena contested by both France and Spain (Schlesier 1972).

Unfortunately, there are few specific references to the Apache in the PCMS, although the above data indicate that the Apache almost certainly claimed southeastern Colorado for at least part of the ethnohistoric period (Schroeder 1974). Specifically, Schroeder (1974) interpreted the 1706 route of Ulibarri's retrieval of Pueblo Indians from El Cuartelejo as passing east of present day Trinidad, along the Emory Pass area and then down Chacuaco Creek to its junction with the Purgatoire River. There, Ulibarri found a group of Penxaye Apaches growing corn, beans and squash. Interestingly, Hyde (1976: 55) gives the creek's name as being derived from Chaguagua, the name of a Ute band. Ulibarri also reported that the Utes and Comanches were raiding the Apache between present day Pueblo and Trinidad but had not yet succeeded in driving them out (Hyde 1976: 64).

A later Spanish expedition in 1719 led by Governor Valverde also found Apache groups occupying southeastern Colorado (Schroeder 1974). Valverde's professed objective was to prevent Ute and Comanche raids on the Apache, although the leisurely nature of the expedition indicates that he had no urgency in accomplishing this (Hyde 1976: 67-70); indeed, Valverde withdrew as soon as it became clear that he was going to make contact with the very Comanches he had been pursuing.

The Comanche, together with the Ute, succeeded in driving the Apache from southern Colorado and adjacent Kansas at the beginning of the 18th century (Weber 1990: XVII-13). With the exception of their defeat by de Anza in 1779 in the vicinity of modern day Pueblo, the Comanche continued to expand their hegemony throughout the southern Colorado plains and areas to the south and east during the 18th century. The Utes raided with the Comanche throughout most of the Colorado plains until the middle of the 18th century, when the Comanche turned on them. The Utes were originally mountain dwellers who made incursions into the Plains through numerous mountain passes (Hyde 1976: 54-57; papers in Nickens [1988]). The Ute Indians allied with numerous Indians during the 18th century, but principally with the Comanche until that alliance dissolved in the mid 18th century. During the latter part of the 18th century, increasing Arapaho and Cheyenne incursions into the western Plains began to shunt the Comanche southward (Hyde 1976). Indeed, by the 1820s large camps of these groups were reported as far south as Pueblo County in southern Colorado (Weber 1990: XVII-18).

During the latter part of the 18th century and continuing into the first half of the 19th century, southern Colorado was contacted by comancheros and ciboleros (Hispanic and Pueblo Indian traders and buffalo hunters) (Weber 1990: XVII-15). The comanchero trade was based on a well-established prehistoric pattern of trade between Pueblo farmers and Plains bison hunters (cf. Spielmann 1991). Initially involving native corn and bison products, by the beginning of the 18th century, the trade system incorporated Spanish goods, including horses and guns, as well as slaves. Trade fairs, such as the one at Taos, become an important component of the New Mexico economy (Carrillo 1990a: XVIII-8). This changed, however, under American rule, since the comancheros were now considered to be thieves and villains (Carrillo 1990a: XVIII-9). Cibolero hunting comprised huge bison hunting expeditions from New Mexico into the adjacent plains in order to take back bison products to their home settlements. These expeditions climaxed in the early 19th century. Bent's Fort, constructed in 1833, just east of La Junta, Colorado, also increased the numbers of Indian traders moving through the area. Increasingly, Anglo traders were attracted to southern Colorado and northern New Mexico to trade with both Indians and Hispanic settlements (Weber 1990: XVII-18-19).

Up to 1821, the ethnohistoric period of southeastern Colorado, as for adjacent areas, was characterized by processes that led to the demise of aboriginal groups as independent entities and increasing control over these areas by Spanish centered to the south. However, this area was never successfully colonized by the Spanish (Carrillo 1990a: XVIII-7), and it gained importance primarily for the resources that could be taken from it through trading and other activities.

Carrillo (1990a: XVIII-7) identifies comanchero trade, cibolero trade, and the sheep industry as the most important economic activities in southern Colorado during this time period. The first two have been briefly described earlier. The sheep-ranching industry climaxed in the final decades of Spanish rule with close to 500,000 sheep being driven south to Mexico every year (Carrillo 1990a: XVIII-13).

After 1821, what Carrillo (1990a: XVIII-1) calls the second period of historical culture change in the area was initiated. Mexican independence opened up trading opportunities between southern Colorado and Hispanic settlements to the south. For instance, pobladores

settled the northern borderlands, appearing in southern Colorado by the 1850s (Carrillo 1990a: XVIII-22), and Carrillo (1990a: XVIII-14) sees similarities between descriptions of their settlements and some of the archeological remains of the PCMS. This second period lasted until the Mexican War of 1846-48 effectively ended Mexican domination of the area.

The 19th century saw increasing military pressure on Indian groups from the United States. In 1851, the U.S. government decided to allocate specific tribal territories to the individual groups (Weber 1990: XVII-19-20), and in 1867 the government signed a treaty with numerous southern Plains tribes, including the Comanche and Kiowa-Apache. This led ultimately to the Reservation Period and the removal of tribes from their homelands. The Comanche, for example, were placed on a reservation in western Oklahoma (Wallace and Hoebel 1952). The so-called American Period officially begins in 1849 (Carrillo 1990a: XVIII-14). The PCMS became part of the newly defined Territory of Colorado, enacted by Congress in 1861. Manifest Destiny and the spirit of western entrepreneurship swept the study area.

Of major concern was the need to open up southern Colorado to commerce, and for this freight (and later mail) companies were needed. Although the Santa Fe Trail, a spur of which passed close to the PCMS, had been open since the 1820s, stage stations for independent companies were established. In 1866, for example, the Hole-In-The-Rock station was opened near present-day Thatcher (Carrillo 1990a: XVIII-20). Throughout the 1870s population increased as the mining and agricultural potential of Colorado was realized, and as a result, various railroads were constructed throughout southern Colorado (Carrillo 1990a: XVIII-21). The traditional comanchero and cibolero activities were closed down, and permanent settlements, both Hispanic and Anglo, began to appear. The former settlements tended to be more self-sufficient and communal than the individual family ranches of the Anglos, who depended on local merchants for most of their supplies (Carrillo 1990a: XVIII-21). Ranching was still based on a mixture of sheep and cattle.

As the 19th century came to a close, Hispanic settlements were gradually bought out by Anglo ranching concerns (Carrillo 1990a: XVIII-21), with Texas cattle drives and the influx of large numbers of open-range cattle beginning the "industrialization" of ranching. In the PCMS area, the two largest cattle concerns were the Prairie Cattle Company and the Bloom Land and Cattle Company. In 1882, Sharps Ranch was established along Lockwood Arroyo (Carrillo 1990a: XVIII-33) the PCMS.

Large commercial interests, often bankrolled by British money, dominated the cattle ranching industry until 1909 when the Enlarged Homestead Act, together with improved agricultural technology and wheat varieties, encouraged small family farming homesteads to flourish in southern Colorado (Carrillo 1990a: XVIII-34-35). Until the middle 1920s, an improved climate, together with the construction of a fairly sophisticated irrigation system at Model, encouraged the local population to grow. Unfortunately, a drought during the late 1920s ended most of these homesteads, and the land reverted back to ranching. A local helium industry and the construction of a booster station temporarily alleviated some of the pains of unemployment, but continued occupation of the PCMS and surrounding areas during the 1930s was made possible only by federal price support systems (Carrillo 1990a: XVIII-37). From the

end of World War II to the early 1980s, cattle ranching provided the economic mainstay of the area, but it was a tenuous existence at best. In 1983, the 12 ranches that now constitute the PCMS were bought by the U.S. Army, and the end of civilian control and use of the PCMS area effectively came to an end (Carrillo 1990a: XVIII-39). The documentary and archeological data of the historic period of PCMS have been examined through a model of enquiry that is based on general processual, ecological-functional principles (South 1977), whereby societies are viewed as systems interacting with the wider natural and social environments (Carrillo 1990b: XIX-1.)

Of the 546 historic sites documented at that time on the PCMS, two site populations have been identified. The first population comprises three different types of homestead sites, and the second population has six different types of livestock related sites (Carrillo 1990c: XXIII-2-3). Interestingly, despite the clear ethnic Hispanic and Anglo populations documented as having lived in the PCMS area, material culture is not unequivocally useful in separating them (Carrillo 1990c: XXIII-20). However, this fact should be seen not so much as condemnation of historical archeology's ability to contribute to historic period knowledge, but rather as an opportunity to explore in detail the role that material culture plays in making ethnic distinctions, a role that has been naively and simplistically assumed in many archeological studies (cf. Duke [1991] for a critique of this assumption). Minette Church's ongoing doctoral research on ethnic identification in the archaeological record of the PCMS should help clarify some of these problems.

CHAPTER 3

REVIEW OF PREVIOUS ARCHEOLOGICAL WORK IN THE PINON CANYON MANEUVER SITE

The history of archeological research in the PCMS is recent for a number of rather obvious reasons. Most importantly, as described elsewhere in this volume, archeological research on the Plains in general is, compared to many other areas on the continent, relatively recent. Also, most of eastern Colorado is privately owned and, therefore, not covered by the numerous federal laws pertaining to historic preservation. The PCMS, however, was transferred to the public domain in 1983, and intensive archeological investigations were initiated soon after. Anderson (1990: I-4-6) has described these investigations, and so the following is intended as a very brief synopsis of these, in order to place current work into perspective. Specific results of these studies are noted in chapter two and elsewhere in this present work. Cultural resource studies have been conducted on the PCMS since 1983 by both university and private consulting agencies: University of Denver; University of Wisconsin-Parkside; Powers Elevation; University of North Dakota, Western Cultural Resource Management; Gilbert-Commonwealth, and others. In 1988, Larson-Tibesar Associates were contracted to synthesize existing historic and prehistoric data into a six-volume report, and this report still forms the single most important reference for research on the PCMS (Andrefsky 1990).

The University of Denver was contracted to conduct archeological surveys in 1983 and 1984, and their work has been reported in a number of volumes, each addressing aspects of the overall program of research (e.g. Kvamme et al. 1985; Peebles 1984; Pozorski and Pozorski 1984a, 1984b). In 1983, the Hogback and Canyon areas were surveyed, as well as portions of the upland mesas and plains. The resultant data were used to generate a predictive model of high-probability areas that were subsequently investigated (Kvamme 1984, 1992). The archeological data were then synthesized into a three volume manuscript edited by Christopher Lintz (1985). Smaller surveys such as area to be affected by erosion control projects were also conducted (Duke and Matlock 1986).

In 1987, Larson-Tibesar Associates was contracted to reevaluate 68 of the University of Denver sites and to complete their field documentation, as well as to record 23 archivally documented historic sites. Additionally, further sampling inventories were conducted. Larson-Tibesar produced a two volume synthesis of test excavations conducted on 50 sites in the PCMS in 1983 (Andrefsky 1990). Larson-Tibesar was also responsible for producing a six-volume synthesis of all historic and prehistoric site inventories and excavations on the PCMS (Andrefsky 1990). As discussed elsewhere in this report, the Larson-Tibesar volumes provide the most current synthesis of archeological work in the PCMS.

The geoarcheology and geomorphology of southeastern Colorado is now much better understood as a result of studies by Schuldenrein et al. (1985) at the PCMS. Of particular value

is the predictive geoarcheological model generated by this work. Historical studies and syntheses have also been provided by Powers Elevation (Friedman 1985), Gilbert/ Commonwealth Inc. (Haynes and Bastian 1987) and the University of Wisconsin at Parkside (Stoffle et al. 1984).

Despite the essentially management-oriented nature of the work in the PCMS, it is encouraging to note that the general public and individual researchers have been given access to the wealth of archeological data generated by these studies. Thus, portions of the Larson-Tibesar synthesis have been published as a memoir of the Colorado Historical Society, giving the public a much-needed synthesis of work in the PCMS (Lintz and Anderson 1989).Others have also initiated projects. For instance, Chomko, DeVore and Loendorf (1990) offer a reappraisal of the Apishapa Phase of southeastern Colorado, based on PCMS data, while Kvamme (1992) reports on the results of a GIS-based, predictive site-location model for the High Plains which is based on the inventory data collected from the PCMS. Loendorf and Kuehn (1991) have presented a synthesis of rock art in the Pinon Canyon. Moreover, Loendorf (1991) published in the international journal *Antiquity* an innovative and important study of cation-ratio varnish dating of ten rock-art sites in the PCMS. Utilizing data acquired from the cultural resource inventory of the PCMS Andrefsky (1994) has recently published an article on lithic procurement in *American Antiquity.*

Finally, the findings of the archeological work at PCMS have also been presented to the public through television programs shown on Public TV. An overview of the PCMS's cultural resources has been shown on KRMA TV of Denver (Chomko et al. 1992), and a program on the PCMS's rock art has been broadcast by KTSC TV of Pueblo (Loendorf and Gange 1990).

CHAPTER 4

RESEARCH DESIGN AND OBJECTIVES

The specific field and laboratory techniques used in this project are documented elsewhere in this report. These techniques were used to evaluate each site for potential nomination to the National Register of Historic Places (NRHP).

The federal legal criteria used in this evaluation are found in 36CFR60 and are as follows:

The quality of significance in American history, architecture, archeology, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

A. that are associated with events that have made a significant contribution to the broad patterns of our history; or
B. that are associated with the lives of persons significant in our past; or
C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D. that have yielded or may be likely to yield information important in prehistory or history.

Sites may have national, state, or local significance.

The Colorado Plains Prehistoric Context (Eighmy 1984: 48-49, 64-65, 77-78, 103, 142-143,152-153) provides criteria for each of the major cultural periods represented on the Colorado Plains that further assist in the evaluation of a site's significance and potential eligibility for nomination to the National Register. Larson-Tibesar Associates provide a specific context for evaluating sites that may contribute to a greater understanding of the prehistory and history of the PCMS (Andrefsky 1990). This context takes the form of a set of research domains that they believe will contribute substantially to this goal.

The first, chronology, is the most important. Projectile point styles are only partially adequate for constructing a chronology, for numerous reasons such as the long-time span of particular styles and their lack, so far, of association with radiometrically dated components. Ceramics are a phenomenon of approximately only the last two thousand years in this part of North America, and the heavy use of cord-marking as a decorative motif limits their use as more sensitive temporal indicators. As suggested by Andrefsky and Zier (1990:VIII-14), radiocarbon,

archeomagnetic, and obsidian hydration techniques need to be used more often in the construction of a local chronology.

Domain 2, paleoenvironments, is crucial to understanding the processes of cultural change in the PCMS. As noted earlier, the regional models of Antevs (1955) and, later, of Wendland and Bryson (Wendland 1978; Wendland and Bryson 1974) are guides only. Local tests of the latter model (e.g. Wilson 1988) have shown the time-transgressive nature of their episodes. Schuldenrein et al. (1985:223-225), for example, has produced a reconstruction of the first millennium climate in the PCMS that is at odds with other scholars' interpretations.

The archeological record at PCMS particularly lends itself to detailed investigations of Domain 3, settlement and subsistence systems. Analyzing the patterns of archeological sites across a region such as PCMS contributes not only to the study of human-environment relations, but also to such phenomena as diffusion and trade.

Domain 4, exchange and mobility, is a corollary of the previous research domain. Unfortunately, as is evident in a recent synthesis of exchange systems in prehistoric North America (Baugh and Ericson 1994), the problems of distinguishing, in the archeological record, between the physical exchange of goods and the movement of people as explanations for exotic materials are considerable.

Domain 5, predictive modelling, addresses the use of univariate and multivariate statistical techniques to improve predictive capabilities for the PCMS. Patterns in site locations can be used to predict settlement and subsistence patterns elsewhere in the PCMS, and these are of use to both management and research objectives.

Friedman (1985:138-429) established five research domains for historic archeological studies in the PCMS: chronology; settlement; economies; demography; and culture. Carrillo (1990b: XIX-1-4) integrated Friedman's work first with Hardesty's (1980) concept of the frontier, whereby zones of cultural transition are distinguishable from cultural zones on either side of it, and secondly with South's (1977) postulate that patterns in historical data will be correlatable with specific facets of human behavior, such as ethnicity. Carrillo (1990b: XIX-3-4) also developed specific research objectives and test implications that would enable him to use strictly archeological data to supplement and augment historic documentary evidence (cf. Carrillo and Kalasz 1990; Kempton and Baber 1990; Kempton and Carrillo 1990; Carrillo 1990c for detailed discussions of this work).

CHAPTER 5
FIELD AND LABORATORY METHODS

FIELD METHODS

Introduction

Field methods rigorously followed those prescribed in the *Guidelines to Required Procedures for Archeological Field and Laboratory Work at Pinon Canyon Maneuver Site, Las Animas County, Colorado* (Dean 1992), and the reader is referred to this document for procedural detail. In a few instances minor changes to the field methods were implemented due to the particular circumstances of the archeological sites. These changes are discussed in the individual site chapters.

Surface Reconnaissance

Site evaluation began with a surface reconnaissance of the site area. All eight sites had been previously designated by the Army as off-limits to mechanized training. In order to protect them, each site had been marked as such, and a protective buffer around each site was indicated by t-bar posts connected with white engineers tape. Surface reconnaissance began with a general inventory of the area within the flagging. The first objective was to try to identify the datum location used by the original inventory crew. These original datum markers consisted of either PVC pipe or rebar. The white PVC pipe was easier to locate, but the pipe was often not in the original location. The rebar datum was always left in place; although, at times it was more difficult to see it in the field especially when the rebar was hidden in tall grasses. In these instances, inventory photographs showing the datum location were helpful. In every instance, a datum marker was located for the site. This datum marker was used for survey and mapping during the testing phase.

After the datum was located, a systematic transect inventory was conducted of the site area. Surface artifacts and features were pinflagged. Features were relocated, and their descriptions were checked against the original descriptions. Any changes to the features, such as visible erosion or change in artifact frequency, since the original recording were noted. Previously unrecorded features were mapped or photographed and described.

EDM Mapping

Mapping was conducted by Melissa Connor from the Midwest Archeological Center, Lincoln, Nebraska. Mapping was completed using a Lietz SET3C total-station transit and SDR33 data recorder. Each transit shot was recorded and given a previously established identification code. The field specimen number was provided by the SDR33 used in autogenerate point mode. All data were entered into the data collector, and a hand-written copy was also kept as a backup. At the completion of each day's work, the recorded data was down-loaded into a Dell laptop computer containing the SOKKIA software program MAP. The raw file was then processed by the computer into MAP. The MAP files were then transferred into

AutoCAD. Once in AutoCAD, the identification codes were checked and any necessary editing completed.

The site datum served as the main mapping station. Additional mapping stations were established as necessary and left unmarked. All artifacts and features were mapped. The mapping team consisted of the surveyor running the machine, a rod person, and a recorder when mapping artifacts. The recorder noted relevant characteristics of collected and uncollected artifacts. Natural features were recorded at the discretion of the surveyor and crew chief and are noted on the finished maps.

Determining meaningful site boundaries was often the single most difficult problem that the testing crew faced. This was particularly evident at sites 5LA4606, 5LA3347, and 5LA5360 because a light artifact scatter continued beyond the predefined boundaries and onto adjacent, previously recorded or unrecorded sites. The problem was enhanced when the sites were subjected to 100 percent surface collections during the original site recording, thereby making it more difficult to relocate the original artifact clusters. The criteria used by the Fort Lewis crew for determining site boundaries drew upon the information from the original site recording, the visible extent of surface artifacts, and the results of the shovel testing. In most cases, the site boundaries varied little from those previously described by the original survey crew. In other cases, such as on site 5LA3570 and 5LA5008, site boundaries were expanded to include either significant features or artifact concentrations that had not been initially recorded.

A previously unrecorded site (5LA6522) was identified and subsequently recorded by Fort Lewis during the testing of site 5LA4606. This site was recorded by Fort Lewis because a small portion of the site was within the existing flagged area for site 5LA4606.

Surface Artifact Analysis and Collection

All surface artifacts from each site were pinflagged with the exception of site 5LA5008, which was so large that artifact clusters, along with a sample of flaked and ground stone tools, were identified and mapped. All flaked and ground stone tools were mapped and described on the remaining seven sites. Flaked debitage was field analyzed using a system described by Sullivan and Rozen (1985). This system of debitage analysis is discussed in length in the section describing laboratory methods. Collected surface artifacts were limited to projectile points, dateable historic items, obsidian flakes, a representative sample of lithic raw material types, and flaked lithic tools. The latter were collected to better determine what types of activities may have been represented at the sites.

Subsurface Testing

Shovel Tests Shovel testing was conducted on all sites except 5LA3570 and 5LA5360. Shovel tests were used to determine both the horizontal and vertical extent of artifacts. On most sites the artifact density was such that shovel tests were not considered a very useful means of determining artifact distribution. On other sites, however, the results of shovel tests were instrumental in determining site significance. Shovel tests were executed according to the

guidelines in the field and laboratory manual. They were placed along azimuth lines and spaced every 4 meters apart. Average shovel test diameter was about 35 cm, and they were excavated to bedrock, sterile substrata, or until the hole could no longer be dug without expanding the diameter (usually around 75 cm). The sediments were screened through ¼" mesh. Shovel tests were recorded on auger/shovel test forms. Information recorded consisted of the diameter, depth, materials recovered, and a brief stratigraphic description. The shovel tests were all mapped with the EDM.

Test Unit Excavation Test unit excavations followed the guidelines set forth in the field and laboratory manual for testing and excavations (Dean 1992). Excavation units were placed non-randomly across the sites. In cases of visible surface features, a test unit was often placed within or adjacent to the feature to determine feature function and the possible association with a use surface. As a rule, test units were 1 m x 1 m in size; however, on occasion test unit size (i.e., 5LA4854 and 5LA3570) was varied to accommodate testing in features. Vertical control consisted of excavating in arbitrary 10 cm levels and within identified stratigraphic layers (natural or cultural). In a few instances, excavations were conducted in 5 cm levels for better vertical control. Units were excavated parallel to the ground surface, and this was a general rule followed throughout the project. The test units were usually set up on true north (11° easterly declination), and all four corners were mapped with the EDM. The exceptions to setting the units to true north were those units that were placed within or adjacent to structures or features.

The fill from all units was screened through either ¼" or ⅛" wire mesh. Artifacts collected from each level were assigned separate field specimen numbers. Artifacts found in-situ were mapped in place in the unit and assigned point provenience numbers in addition to a field specimen number.

A 33 cm x 33 cm control sample (1/9 of the level) from each level (10 cm) was retained for waterscreening through 1/16 " hardware mesh. Most of the waterscreening was conducted at the field laboratory, and this greatly reduced the bulk transported back to the laboratory at Fort Lewis.

Field Recording

Field work was recorded on the appropriate PCMS forms . In addition to the standard PCMS forms, additional Fort Lewis College forms were used for field specimen inventories and for stratigraphic descriptions. Photographs were taken throughout the project. These consisted of 35mm black-and-white photographs and accompanying 35mm color slides.

Stratigraphic profile drawings were completed for two walls from every test unit. Photographs were taken of every unit as well. Descriptions of the strata from the unit were completed. These descriptions included such information as pedogenic structure, Munsell color, soil texture, inclusions, reaction with hydrochloric acid, evidence of burning, soil designation, and evidence of cultural features or artifacts. These descriptions and interpretations are included in the test unit discussions in the individual site chapters.

Samples collected for special analysis included: soil samples; pollen samples; obsidian samples for sourcing and hydration dating; samples for radiocarbon dating; and macrobotanical samples. Soil samples were collected from all eight sites. Collection of other samples depended on their potential to contribute information about the site that would aid in determining eligibility status.

At the completion of site testing, all subsurface tests were backfilled. The sod layer that was removed from the surface of each site was replaced over the unit.

Evaluative testing for National Register eligibility recommendation was conducted on eight sites by Fort Lewis College. With the exception of 5LA3570, which is in imminent danger from erosion, mitigation recommendations are not addressed in this report.

LABORATORY METHODS

Introduction

Laboratory methods for this project followed those prescribed in Dean (1992). These specifications were rigorously followed throughout the laboratory analysis. In addition to the guidelines for analysis of lithic artifacts set forth in the manual (Dean 1992), additional artifact analysis was completed on the nontool debitage. These procedures will be discussed later in this chapter.

All artifacts were washed and rebagged after returning to the laboratory. The only exceptions were pollen wash samples, obsidian, and metal artifacts. The metal objects were lightly brushed if necessary but were never washed. The majority of artifacts were sorted by artifact class during excavation. Any changes to classification were worked out prior to analysis.

Artifacts collected and analyzed consisted of flaked lithic and ground stone artifacts, faunal remains, and historic artifacts. No prehistoric ceramics were recovered from this project.

Flaked Lithic Artifacts

Lithic artifacts were divided into the following categories: bifaces; flake tools; cores; blocks; split pebbles; complete flakes; and broken debitage. These categories are the prescribed categories from the PCMS manual (Dean 1992), and all artifacts were recorded under these categories. However, the lithic analysis went beyond these standards in two respects. Projectile points were typed, and nontool debitage was divided among four smaller categories. Classification of projectile points utilized two primary sources: Lintz and Anderson (1989), and Fulgham and Anderson (1984). On occasion other sources were consulted, and these sources include Andrefsky (1990), Gunnerson (1989), Ireland (1968), Irwin and Irwin (1959), Irwin-Williams (1967), Irwin-Williams and Irwin (1966), Irwin-Williams (1967), and Wood and Bair (1980). Raw material types of both flaked and ground stone artifacts were identified using Ahler's (1992) raw material classification.

Nontool Debitage

In addition to the PCMS classification for broken debitage, all nontool debitage was subjected to more detailed analysis. Analysis of nontool debitage followed the methodology and descriptions of Sullivan and Rozen (1985:755-779). Their approach to debitage analysis is designed to describe distinctive assemblages of artifacts rather than the more traditional analysis, which describes assemblages of distinctive artifacts. Furthermore, they argue that current debitage analysis is based on the assumption that technological origins can be identified from key attributes alone when, in fact, the technological origins of most artifacts cannot be individually determined because reduction often proceeds as a continuum rather than as a sequence of discrete stages. Sullivan and Rozen (1985:756-757) propose a hierarchical key to enhance "interpretation-free" categories and objectivity. Their key has three dimensions of variability. Each dimension has two naturally dichotomous attributes.

The lithic debitage was separated into four categories: debris, flake fragments, broken flakes, and complete flakes. Complete flakes were separated from all other debitage on the basis of the following characteristics: single interior surface, intact striking platform (point of applied force or impact), and intact margins. A single interior surface is indicated by ripple marks, force lines, or a bulb of percussion. A point of applied force is indicated by an intact striking platform or by the origin of force line radiation where only a fragmentary striking platform remains. Margins are intact if the distal end exhibits a hinge or feather termination, or if snap breaks do not interfere with accurate width measurements. The length of complete flakes was measured as the maximum length of the flake from the point of impact to the point where a 90° line intersects the bottom of the flake. The width is described as the maximum width of the flake perpendicular to the percussion axis.

Groundstone Artifacts

Ground stone analysis was conducted on the few specimens collected from the project. These artifacts were examined for shaping, grinding, and battering. Whenever possible, the distinction was made between metates and manos according to the PCMS field and laboratory manual (Dean 1992).

Faunal Remains

Faunal material was analyzed by Fort Lewis College students using the comparative collection housed in the Department of Anthropology of the college. Due to the small size of much of the bone, speciation was not possible in most cases.

Historic Artifacts

Historic artifacts were also analyzed using the standards required by the PCMS (Dean 1992). The artifacts were cataloged on the appropriate PCMS forms. Sources used to identify historic artifacts included: Barber (1987), Carrillo et al. (1989); Gillio et al. (1980); Kempton and Baber (1990); and Stadt (1984).

Special Samples

Samples obtained from the field for special analysis included soil samples, radiocarbon samples, pollen samples, flotation samples (macrobotanical), and obsidian hydration samples. Immediately upon returning from the field, samples were screened for special analysis, and those believed to possess the best opportunity for producing significant information about the site were selected for analysis. Samples processed "in house" included soil samples and flotation samples. The remaining samples were sent to various specialists.

Soil Samples A large portion of the general sediment analysis was accomplished while in the field. This included such observations as pedogenic structure, Munsell color, presence or absence of calcium carbonate, general soil description, general texture, inclusions, and depositional processes. The laboratory work consisted of refining the soil texture through LaMotte Soil Texture analysis and examination of the sand fraction under a 30 X power microscope. A soil sample from each site was cataloged and retained for curation.

Radiocarbon Samples Charcoal for radiocarbon analysis was obtained from samples in the field as well as from flotation samples. These samples were sent to Beta Analytic, Inc. of Miami, Florida for analysis (Appendix I). Charcoal samples were sent from two sites. A sample was collected from a hearth feature and three samples were sent from stratigraphic contexts. It was necessary to use AMS dating techniques on three of the four samples.

Pollen Samples Samples for pollen analysis consisted of two types: sediment and pollen wash. The artifacts selected for pollen washes were double bagged in the field in paper bags and were sent to the pollen lab unopened. Pollen analysis was completed by R. Scott Anderson, of the Laboratory of Paleoecology at Northern Arizona University, and the results of the analysis are presented in Appendix II. The two groundstone artifacts from which the pollen washes were obtained were sent back to Fort Lewis College, and were subsequently analyzed. All remaining pollen samples collected in the field were cataloged and retained for curation.

Flotation Samples Flotation samples were processed with a barrel flotation system. The heavy fraction was collected in 1/32" mesh window screen. The light fraction was collected using chiffon cloth. The heavy fraction was sorted using a 10X florescent magnification light. Artifacts recovered within the heavy fraction samples were removed, analyzed, and cataloged. After the artifacts were removed from the sample, the remaining sand and rock were discarded. The light fraction samples were scanned to determine absence or presence of materials including charcoal, seeds, roots, snails, and bug particles. Light fraction samples were bagged, catalogued, and retained for curation. Besides charcoal and non-artifactual materials, the flotation samples produced no other remains. Any other materials, including unused charcoal, were retained from these samples and curated.

Obsidian Hydration Obsidian samples obtained for analysis were sent to Christopher Stevenson, of Diffusion Laboratory of Columbus Ohio for hydration analysis and sourcing. The two samples sent for analysis were collected from the surface. A control sample was not submitted for analysis. Results are presented in Appendix III.

Recording

Recording was completed on PCMS forms appropriate for each level of analysis, and they were completed in strict accordance with the standards and guidelines provided in the PCMS manual (Dean 1992). The cataloging and analysis of artifacts were completed on appropriate PCMS documentation forms and were computerized in dBase III Plus format and saved on diskette. Much of the analysis and all of the cataloging was completed by Fort Lewis students whose work was routinely checked by their supervisors to ensure the quality and consistency required in the manual.

Photographs

Black-and-white photographs and color slides were taken over the course of field work. These were processed, and contact sheets were made of the black-and-white negatives. The catalog number assigned to a roll of film was also applied to the contact sheet, negatives, and field photo log.

CHAPTER 6
5LA3347

INTRODUCTION AND LOCATIONAL INFORMATION

Eligibility testing at site 5LA3347 was conducted from September 7, 1994 through September 9, 1994. A total of 14 person days were spent at the site. Archaeological investigations included the production of a site map with the EDM, field analysis of all visible surface artifacts, thirty-three shovel tests, and five test unit excavations. A buried cultural horizon was identified in one of the test units, and a prehistoric use surface with a sandstone metate and an anomalous rock feature was identified in two of the other units. The results of these investigations demonstrate that the site is eligible for nomination to the NRHP under Criterion D: the potential to yield significant information about the prehistory of the inhabitants of the PCMS.

Site 5LA3347 covers an area of 14,000 m². The site consists of a flaked lithic and ground stone scatter located along the edge and just back from the rim of Taylor Arroyo (Figure 6.1). A tributary canyon of Taylor is located to the east and Taylor Arroyo to the south. The site is equidistant to both canyons. It is located in an open, flat area at the transition between the

Figure 6.1 General site overview, 5LA3347. View to the northeast.

Steppes and the Arroyo/Canyon Landscape Units (Figure 1.2). The topography slopes slightly in all directions except to the southwest where it rises gently to the rim of Taylor Arroyo. Figure 6.2 illustrates site boundaries, surface artifacts, subsurface tests, and topographic detail.

SITE SETTING

Geology

Cretaceous-age Dakota Sandstone is exposed in deflated areas across the site. Some of the exposed sandstone is rounded and smooth, a result of prolonged weathering, while other exposures are more recent and appear craggy and angular. Artifact concentrations often occur near bedrock outcrops.

Soils

Soils on the site are mapped as Travessilla-Wiley-Villagreen (U.S.S.C.S 1983). Sediment accumulations are largely the result of residual and eolian processes. The undulating bedrock and gentle slope allow for varying sediment accumulation across the site. Low areas between bedrock outcrops collect windblown as well as colluvial sediments. A thin Soil "A" horizon is developed in these sediments. It is a brown, silt loam with sand and a granular to weak blocky structure. It overlies a weak Soil "B" horizon developed in eolian and residual sediments. This is a massive silt-to-sand loam with a strong caliche presence. Lower in the profile, caliche and sandstone gravel become dominant just above the bedrock. In some places a weathered "C" horizon was encountered.

Vegetation

The dominant vegetation at the site is blue grama grass, three-awn grass, and needle and thread grass. Scattered juniper are present, as well as sagebrush, yucca, cholla, stickweed, Blackfoot Daisy, and sunflower.

PREVIOUS SURVEY RESULTS

The site was identified and recorded in 1984 by an archaeological crew from the University of Denver during a survey of nonrandom, high site probability portions of Area C at the PCMS (Colorado State Site Form, 5LA3347). The site was described as a flaked lithic and ground stone scatter with four possible hearth features. One hundred and twenty-three artifacts were flagged and mapped on the surface. Of the surface artifacts, many were metate and mano fragments. A sample of the groundstone was collected; the remainder were mapped and described but were not collected. The entire flaked lithic assemblage was mapped and collected.

Four features were mapped and described as hearth features because they contained fire-cracked rock and ashy sediments; however, no charcoal or oxidation was observed. The basis for determining a Late Prehistoric temporal affiliation lay in the identification of three projectile points, one whole and two broken. Projectile point 3347.53, Category P29 (Lintz and Anderson 1989:146), is tentatively dated between 500 B.C. and A.D. 600, point 3347.21, Category P48 (Lintz and Anderson 1989:170-171), is dated between A.D. 1000 and A.D. 1400, and point

3347.74 was described by the survey crew as a quartzite projectile point preform (Colorado Site Form, 5LA3347). Thus, based on the *possibility* of buried hearth features with charcoal for radiocarbon dating and association with projectile points, the site was determined to have the potential to yield significant archaeological information, and testing was recommended.

RESULTS OF ELIGIBILITY TESTING

Surface Reconnaissance

A general pedestrian inventory of the flagged area between the two canyons showed that flaked and ground stone artifacts were present in varying quantities across the entire area between the two canyons. Artifact concentrations were separated by large areas of few artifacts; artifacts continued for an undetermined distance beyond the mapped site boundary. After two hours of pedestrian inventory by the crew, the original rebar datum for 5LA3347 was located. Another site, 5LA3346, had been recorded 150 meters northwest of 5LA3347's datum, and the closeness of the two sites made it difficult to recognize distinct boundaries between the sites. Site boundaries for 5LA3347 were slightly modified from those on the original inventory form, but altogether they approximated the original multi-lobed site boundaries (Figure 6.2).

The pedestrian inventory conducted by FLC identified 122 flaked and ground stone artifacts. These artifacts were flagged, mapped and field analyzed. The artifacts were primarily concentrated in two areas of the site (Figure 6.2 and Figure 6.3). Flaked lithic artifacts included one broken projectile point, bifacial and unifacial tools, utilized flakes, core tools, flakes, and flaking debris (Table 6.1). Both complete and fragmented metates and manos were also mapped and recorded. One metal hinge was mapped. The projectile point was collected for laboratory analysis along with a representative sample of lithic material types. In addition to the surface artifacts, the FLC crew located three of the four fire-cracked rock features described in the original survey. Two additional surface features (Features 4 and 5) were identified by the FLC crew, and these five features are described below.

Feature 1 consists of an area measuring 2 m x 3 m of grayish sediments and angular sandstone rock. Many of the sandstone rocks appeared to be fire-cracked. The grayish tint to the sediments was assumed to be the result of decaying charcoal, although actual charcoal flecks were not identified.

Feature 2 is a concentration (2 m x 1 m) of angular sandstone, possibly fire-cracked rock, located in an area of shallow, sandstone bedrock. Several mano and metate fragments and numerous lithic artifacts were observed around the feature. Although sediments were darker within the concentration, charcoal was not identified from the surface.

Feature 3 is a large circular stain originally defined as 4 m x 2 m surrounding a 1 m x 1 m fire-cracked rock concentration. The entire area of the dark stain was troweled, and the scrapings were screened through ¼" and ⅛" mesh. After trowelling, the stain measured 8 m x 10 m and consisted of dark gray sediments that appeared to be charcoal enriched; however, distinct

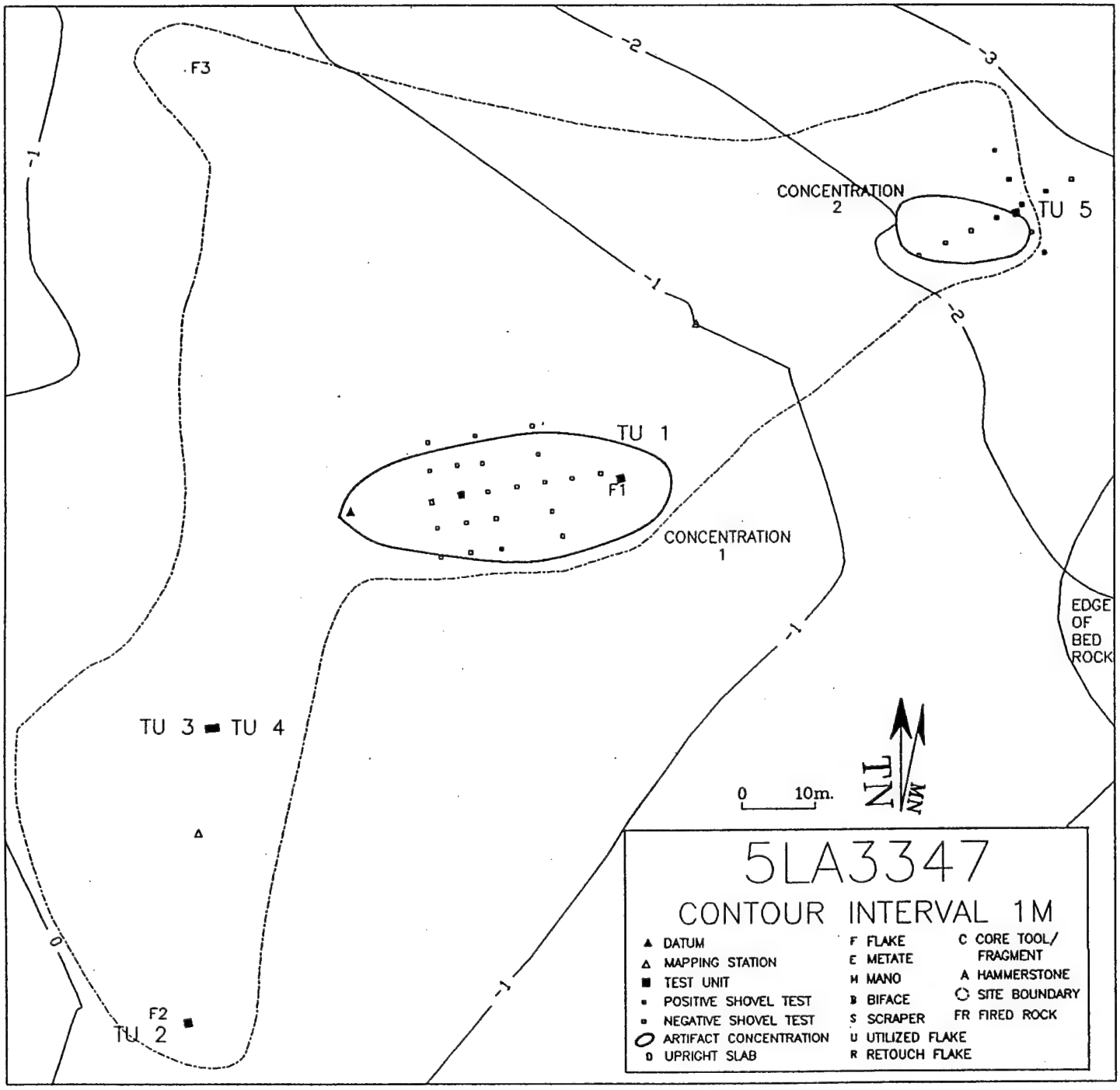

Figure 6.2 General site map, 5LA3347.

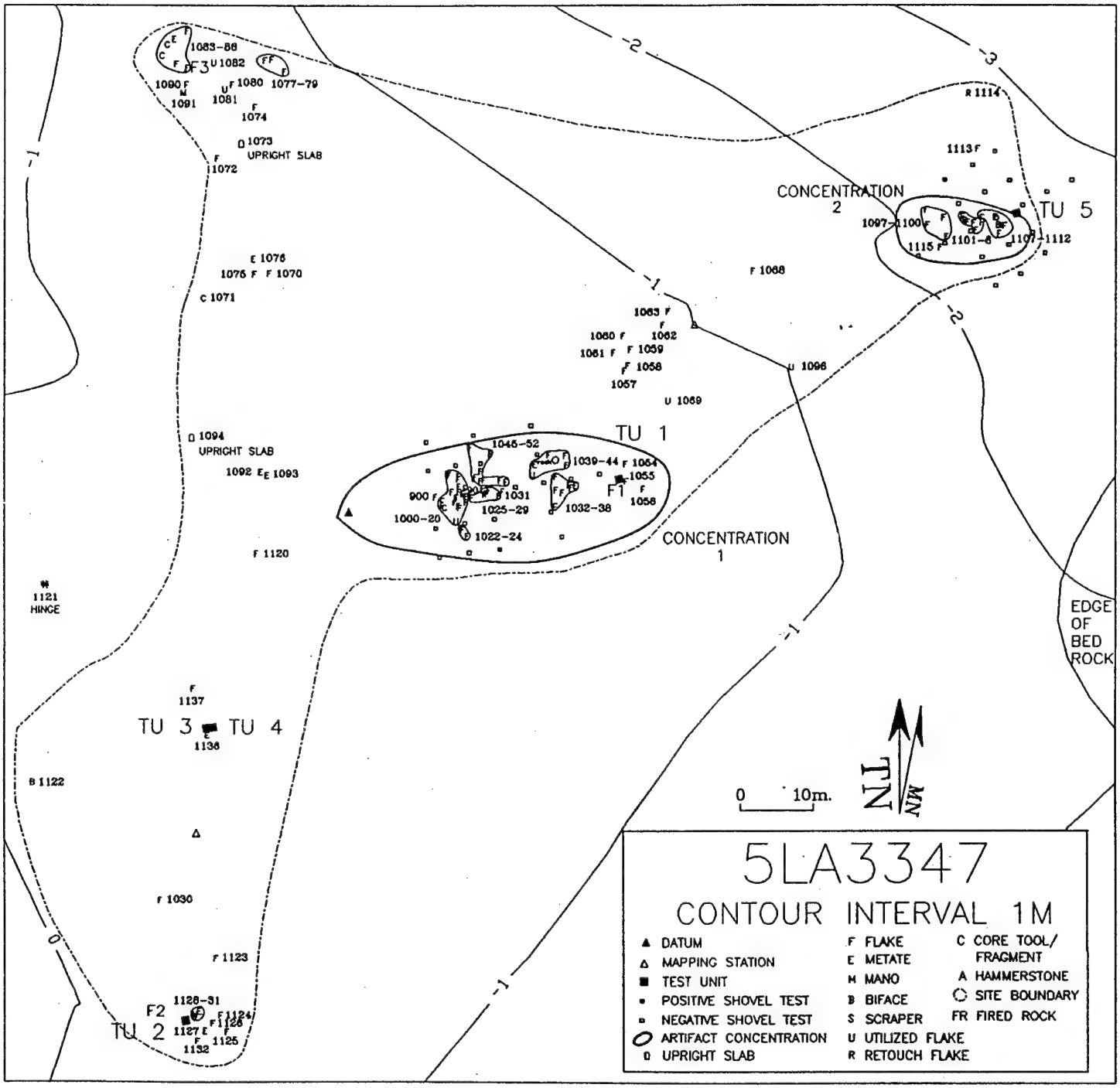

Figure 6.3 General site map with surface artifacts, 5LA3347.

charcoal flecks were not observed. Depth to bedrock was shallow, and in portions of the feature the bedrock was exposed at the surface. The maximum depth of the gray sediments was about 10 cm below the surface. One piece of lithic debris was found on the surface; however, no artifacts were recovered from the scrapings in the feature. The origin and function of this enigmatic feature remain unknown; possibly it is a natural, organic stain from decaying vegetation. A less likely possibility is that the stain is the remains of a cultural feature such as a decayed brush structure.

Feature 4 is a series of axe-cut, dead juniper branches surrounding a small juniper grove (10 m x 12 m). Axe-cut dead juniper branches are scattered around the south side of the grove and a few are on the north side of the grove. The area was scanned with the metal detector, but no metal was detected. The branches of the largest juniper tree arch into a smaller tree forming a natural shelter.

Feature 5 is a scatter of axe-cut dead juniper branches surrounding a small juniper grove. The scatter encompasses an area 10 m x 10 m. A large, dead tree stump is in the center of the grove where branches have been axe cut. The axe-cut branches were concentrated on the south side of the grove. On the west side of the grove were two axe-cut branches that had one end stuck in the ground and the other end propped against the tree. The metal detector did not identify any metal objects.

Subsurface Investigations

Subsurface testing at this site consisted of thirty-three shovel tests and five 1 m x 1 m test unit excavations.

Shovel Tests Shovel tests were placed in the two areas with artifact concentrations. Shovel tests were all spaced 4 m apart. A main shovel test line was placed through each concentration, and a series of lines were placed at 90°angles to the main shovel test line. These were not aligned to magnetic north but all were mapped in with the EDM. Shovel tests were excavated to sandstone bedrock, a compacted layer of caliche, or until the depth of the test hole was too great to continue excavating without expanding the diameter of the hole; this was usually about 70 cm below the surface. The shovel tests averaged 25 cm in diameter. Twenty-two shovel tests were excavated in Concentration 1 (Table 6.2) and 11 in Concentration 2 (Table 6.3). The average depth of the shovel test was 30.5 cm below ground surface (bgs). Six of the thirty-three test holes (18 %) produced subsurface artifacts; the majority of these were located in Concentration 2.

Table 6.1 Surface artifacts, 5LA3347, PCMS.

Map No.	Artifact Type	Debitage Category	Material Type
1000	Flake	Fragment	Quartzite
1001	Flake	Complete	Quartzite
1002	Core Tool	NA	Red/orange chert
1003	Flake	Broken	Quartzite
1004	Flake	Fragment	Quartzite
1005	Flake	Complete	Quartzite
1006	Flake	Fragment	Quartzite
1007	Flake	Broken	Quartzite
1008	Flake	Broken	Quartzite
1009	Flake	Broken	Quartzite
1010	Flake	Fragment	Quartzite
1011	Flake	Fragment	Quartzite
1012	Flake	Complete	Quartzite
1013	Debris	Debris	Quartzite
*1014	Flake	Fragment	Quartzite
1015	Flake	Fragment	Quartzite
1016	Flake	Complete	Quartzite
1017	Flake	Fragment	Quartzite
1018	Flake	Complete	Quartzite
1019	Flake	Fragment	Quartzite
1020	Flake	Broken	Quartzite
1022	Flake	Fragment	Quartzite
1023	Flake	Fragment	Quartzite
1024	Flake	Fragment	Quartzite
1025	Flake	Fragment	Quartzite
1026	Flake	Broken	Quartzite

Map No.	Artifact Type	Flake Type	Material Type
1027	Debris	Debris	Quartzite
1028	Debris	Debris	Chert
1029	Flake	Fragment	Quartzite
1030	Flake	Fragment	Quartzite
1031	Flake	Fragment	Quartzite
1032	Debris	Debris	Chert
*1033	Core Fragment	NA	Quartzite
1034	Flake	Fragment	Quartzite
1035	Debris	Debris	Chert
1036	Debris	Debris	Chert
1037	Metate Fragment	NA	Sandstone
1038	Debris	Debris	Quartzite
1039	Flake	Fragment	Quartzite
1040	Debris	Debris	Chert
1042	Debris	Debris	Basalt
1043	Metate Fragment	NA	Sandstone
1044	Utilized Flake	NA	Quartzite
1045	Flake	Fragment	Quartzite
1046	Flake	Fragment	Quartzite
1047	Flake	Fragment	Quartzite
1048	Flake	Fragment	Quartzite
1049	Flake	Complete	Quartzite
1050	Flake	Fragment	Quartzite
1051	Flake	Fragment	Quartzite
1052	Flake	Fragment	Quartzite

Map No.	Artifact Type	Flake Type	Material Type
1054	Debris	Debris	Basalt
1055	Flake	Complete	Quartzite
1056	Core Fragment	NA	Red chert
1057	Flake	Fragment	Basalt
1058	Flake	Broken	Quartzite
1059	Debris	Debris	Basalt
1060	Flake	Complete	Quartzite
1061	Flake	Complete	Basalt
1062	Flake	Complete	Quartzite
1063	Debris	Debris	Basalt
1068	Debris	Debris	Argillite
*1069	Flake	Fragment	Chert
1070	Flake	Broken	Basalt
1071	Core Fragment	NA	Quartzite
1072	Flake	Fragment	Argillite
1074	Debris	Debris	Basalt
1075	Debris	Debris	Argillite
1076	Metate Fragment	NA	Sandstone
1077	Debris	Debris	Basalt
1078	Debris	Debris	Argillite
1079	Debris	Debris	Chert
1080	Debris	Debris	Basalt
*1081	Utilized Flake	Complete	Argillite
1082	Utilized Flake	NA	Argillite
1083	Debris	Debris	Basalt
1084	Metate Fragment	NA	Sandstone

Map No.	Artifact Type	Flake Type	Material Type
1085	Core Tool	NA	Basalt
1086	Core Fragment	NA	Quartzite
1087	Debris	Debris	Chert
1089	Flake	Complete	Quartzite
1090	Flake	Broken	Basalt
1091	Mano	NA	Sandstone
1092	Metate	NA	Sandstone
1093	Metate	NA	Sandstone
1095	Flake	Broken	Chert
*1096	Utilized Flake	NA	Argillite
1097	Debris	Debris	Quartzite
1098	Debris	Debris	Quartzite
1099	Debris	Debris	Quartzite
1100	Flake	Complete	Basalt
1101	Debris	Debris	Quartzite
*1102	Biface Fragment	NA	Argillite
*1103	Flake	Complete	Argillite
1104	Flake	Complete	Quartzite
1105	Flake	Complete	Argillite
1106	Debris	Debris	Quartzite
1107	Flake	Complete	Chert
1108	Flake	Complete	Argillite
*1109	Biface	NA	Quartzite
1110	Debris	Debris	Quartzite
1111	Flake	Fragment	Quartzite

Map No.	Artifact Type	Flake Type	Material Type
1112	Flake	Complete	Basalt
1113	Flake	Fragment	Quartzite
1114	Retouched Flake	NA	Quartzite
1115	Flake	Broken	Chert
1120	Flake	Broken	Red Chert
1121	Metal Hinge	NA	NA
1122	Biface	NA	Argillite
1123	Flake	Fragment	Quartzite
1124	Debris	Debris	Quartzite
1125	Debris	Debris	Argillite
1126	Flake	Complete	Quartzite
1127	Metate Fragment	NA	Sandstone
1128	Metate Fragment	NA	Sandstone
1129	Mano	NA	Sandstone
1130	Flake	Complete	Sandstone
1131	Metate Fragment	NA	Sandstone
1132	Debris	Debris	Quartzite
1133	Utilized Flake	NA	Red Chert
1136	Metate	NA	Sandstone
1137	Debris	Debris	Siltstone
*1138	Projectile Point	NA	Quartzite

*Collected

Table 6.2 Shovel tests results, Concentration 1, 5LA3347, PCMS.

No.	Depth of Stratum (cm)	General Stratigraphic Description	Materials Recovered
1	45	10YR 5/3 brown massive to granular sand loam with possible angular, fire-cracked rock appearing between 0 - 2 cm bgs	No artifacts
2	44	10YR 5/3 brown silt loam, massive to granular with caliche and sandstones gravel grading to a more dense caliche and gravel layer	No artifacts
3	34	10YR 5/3 brown silt loam with caliche and sandstone gravel grading to heavier caliche and gravel layer. Structure massive to granular with a very shallow Soil "A" horizon	No artifacts
4	34	10YR 5/3 brown massive to granular sand to silt loam with caliche and gravel mixed throughout unit to contact with heavy caliche and gravel layer	No artifacts
5	20	10YR 5/3 brown silt loam with sand, deflated area with caliche and gravel to contact with heavier caliche and gravel layer	No artifacts
6	25	Same as Shovel Test 5	1 flaked lithic
7	23	10YR 5/4 yellowish brown massive to granular sand loam with caliche and gravel, shallow Soil "A" horizon	No artifacts
8	50	10YR 5/3 massive to granular brown silt loam with caliche and gravel to heavier caliche and gravel layer	No artifacts
9	32	Same as Shovel Test 8	No artifacts
10	28	Same as Shovel Test 8	No artifacts
11	36	Same as Shovel Test 8	No artifacts
12	38	Same as Shovel Test 8	No artifacts
13	28	Same as Shovel Test 8	No artifacts
14	16	Root zone to bottom, 10YR 5/3 brown massive to granular sand to silt with caliche and gravel to sandstone bedrock	No artifacts

No.	Depth of Stratum (cm)	General Stratigraphic Description	Materials Recovered
15	15 30	Root zone, 10YR 5/3 brown massive to granular silt to sand, fairly heavy caliche with gravel grading to heavy caliche layer	No artifacts
16	15 32	Root zone, 10YR 5/3 brown massive to granular silt to sand, caliche gravel to bottom	No artifacts
17	10 20	Root zone, 10YR 5/3 brown, massive to granular silt to sand, caliche gravel to bottom	No artifacts
18	10	Same as Shovel Test 17	No artifacts
19	3	Same as Shovel Test 14 to sandstone bedrock	No artifacts
20	18	Same as Shovel Test 14 to sandstone bedrock	No artifacts
21	10	Same as Shovel Test 14 to sandstone bedrock	No artifacts
22	22	Same as Shovel Test 14 to sandstone bedrock	No artifacts

Table 6.3 Shovel test results, Concentration 2, 5LA3347, PCMS.

Shovel Test No	Depth of Stratum (cm)	General Stratigraphic Description	Materials Recovered
1	6 25	10YR 5/3 brown loose sand to sand loam more compacted silt loam 10YR 5/3 brown silt loam with increased caliche and sandstone gravel grading to dense caliche and sandstone layer	No artifacts
2	5 30	Same as Shovel Test 1	No artifacts
3	7 37	Root zone, same as Shovel Test 1, Stratum 1 Same as Shovel Test 1 with less caliche and sandstone and deeper	No artifacts
4	6 49	Same as Shovel Test 1 with sandy loam 10YR 5/3 brown massive to granular sandy loam with less caliche and deeper	1 flaked lithic, 0-10 cm bgs
5	6 56	Same as Shovel Test 1, Stratum 1 Same as Shovel Test 1, Stratum 2 with fire-crack rock (?) at 32 cm	3 flaked lithics 0-20 cm fcr 25-28 cm bgs
6	3 33	Same as Shovel Test 1 with more loose silt Same as Shovel Test 2 but more compacted with increased caliche and sandstone gravel	2 flaked lithics 0 - 10 cm bgs
7	5 32	Same as Shovel Test 6	No artifacts
8	7 40	Same as Shovel Test 6 except Stratum 2 is more compacted	1 flaked lithic 0-10 cm bgs
9	6 33	Same as Shovel Test 8 Same as Shovel Test 8 except more shallow	No artifacts
10	6 33	Same as Shovel Test 9 except heavy, dense caliche appears toward bottom	No artifacts
11	3 36	Same as Shovel Test 9	1 flaked lithic 0-10 cm

Test Unit Excavations Five test units were excavated at this site (Table 6.4). The test units were all 1 m x 1 m in size. They were excavated in arbitrary 10 cm levels within identified layers and with the contour of the ground surface.

Table 6.4 Test unit results, 5LA3347, PCMS.

Test Unit No.	Size (m)	Layers (N)	Levels (N)	Final Depth (bgs)
1	1 X 1	2	4	40 cm
2	1 X 1	1	2	20 cm
3	1 X 1	1	1	10 cm
4	1 X 1	1	1	10 cm
5	1 X 1	1	3	40 cm

Test Unit 1. Test Unit 1, at the east edge of Concentration 1, was placed over a group of fire-cracked rock described as Feature 1 on the original site map. The test unit was excavated in four levels to a total depth of 40 cm below the ground surface (Table 6.5). Fire-cracked rock was common in Levels 1 and 2, but by Level 3 the fire-cracked rock had disappeared. Although artifacts were recovered from all levels, they decreased significantly after Level 3 and just below the fire-cracked rock. Four of the 10 artifacts from this test unit were recovered from the waterscreen samples; three of the four were large enough to have been retained by the ¼" mesh.

Table 6.5 Results of Test Unit 1, 5LA3347, PCMS.

Layer	Level	Depth (bgs)	Material Recovered
1	1	6 - 10 cm	2 lithic artifacts
1	2	20 - 23 cm	4 lithic artifacts
1	3	30 - 32 cm	3 lithic artifacts
2	4	37 - 40 cm	1 utilized flake

Stratigraphy. The south and west walls were photographed and illustrated. Figure 6.4 is a drawing of the west wall. Three primary stratigraphic units were recognized in these profiles. These are described below.

Stratum 1 is a brown (10YR 5/3) residual and eolian silt loam with a granular texture. Artifacts and burned rock are present along with large and small sandstone and caliche gravel. An occasional charcoal fleck was observed. Roots and other organic material were common in the stratum. This stratum represents a very shallow (< 10 cm) Soil "A" horizon. The lower boundary is clear.

Stratum 2 is a brown (10YR 5/3) silt loam with sand and increasingly larger sandstone and caliche gravel and cobbles. The texture is massive, and sediments react very strongly with hydrochloric acid. Some burned rock and an occasional artifact occur in this eolian and residual deposit. The lower boundary is gradual. This is the top of a weak Soil "B" horizon.

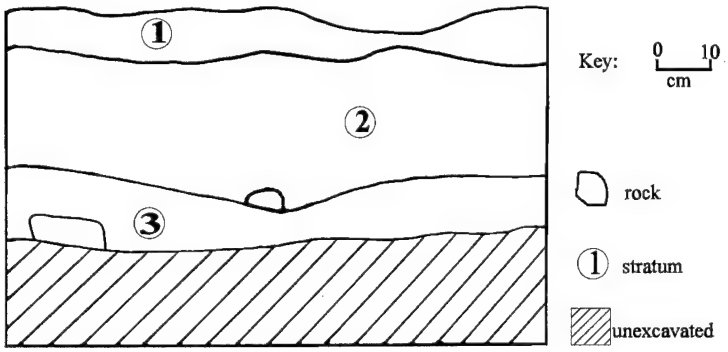

Figure 6.4 West wall profile, Test Unit 1, 5LA3347.

Stratum 3 is a brown (10YR 5/3) silt loam with sand. The structure is massive with larger pieces of sandstone and caliche. There is a very strong reaction with hydrochloric acid. No artifacts, charcoal or burned rock are present in the stratum. It is composed of some eolian sediments; however, residual sandstone sediments with decomposing sandstone dominate the stratum. It is the top of the weathered "C" horizon.

The stratigraphy of this unit shows a very shallow Soil "A" horizon with burned sandstone and an occasional artifact. The sediments consist of a silt loam with increasing sand and gravel deeper in the profile. The sediments grade from eolian silts to residual sands. The burned rock was not a recognizable feature. The rocks may indicate the remains of a deflated hearth or roasting feature, or perhaps detritus from a stone boiling feature, although evidence of

oxidation was not identified. Artifacts continue below the burned rock, but a definite use surface or cultural horizon was not identified.

Test Unit 2. This test unit was placed at the far southern portion of the site and near the canyon rim. Previously, this area was described as Feature 2, a fire-cracked rock and lithic and ground stone concentration (Colorado State Site Form, 5LA3347). Because angular sandstone outcrops along the canyon rim, deposits were believed to be shallow here, but the presence of flaked and ground stone artifacts suggested the possibility of buried cultural remains at this location. A 1 m x 1 m unit was placed over a piece of groundstone. The unit was excavated in 10 cm levels (Table 6.6). Lithics debris and groundstone were recovered from the upper 5 cm while one flaked lithic was recovered between 5 and 10 cm bgs. Excavations were terminated when decomposing bedrock appeared at the bottom of Level 2.

Table 6.6 Results of Test Unit 2, 5LA3347, PCMS.

Layer	Level	Depth (bgs)	Material Recovered
1	1	10 cm	1 groundstone 2 lithic artifacts 2 lithic tool fragments
1	2	20 cm	1 lithic artifact

Stratigraphy. Profile drawings were completed of the north and east walls and photographs were taken of these walls. Three strata were identified from the unit; these are described below. Figure 6.5 illustrates the east wall profile of this test unit.

Stratum 1 is a brown (10YR 5/3) silt loam with sand. Roots and other organic materials occur in the stratum. Soil structure is granular to weak blocky. Artifacts, medium to large angular sandstone, and caliche are present in this eolian and residual deposit. There is good reaction with hydrochloric acid. This is a thin (< 5 cm) Soil "A" horizon. The lower boundary is clear.

Stratum 2 is a light brownish gray (10YR 6/2) silt loam with sand. The structure is weak blocky. Medium to large angular sandstone and caliche are present in the stratum. The deposits have a good to strong reaction with hydrochloric acid. Artifacts and roots are scarce and restricted to the upper portion of the stratum. The sediments become more compacted at the bottom of the stratum. This is the upper part of a weak Soil "B" horizon. The lower boundary is gradual to clear.

Stratum 3 is a light brownish gray (10YR 6/2) silt loam with sand and decomposing bedrock. It has a very strong reaction with hydrochloric acid. It is culturally sterile and represents a saprolite (weathered "C") horizon.

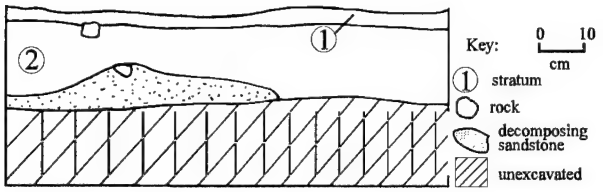

Figure 6.5 East wall profile, Test Unit 2, 5LA3347.

Artifacts were confined to the upper 5 to 10 cm of the unit. The sediments quickly graded to a heavy caliche and decomposing sandstone stratum. The increased vegetation and stronger soil structure of Test Unit 2 over Test Unit 1 can be interpreted as a more stable surface area. A formal feature was not identified, nor was there any indication of a buried cultural horizon or use surface.

Test Units 3 and 4. Two adjacent 1 m x 1 m test units were excavated over a partially buried sandstone metate. Test Unit 3 was placed directly over the metate and excavations were limited to one 10 cm level. Other than the metate, only one lithic artifact was recovered from the unit. Several angular sandstone rocks appeared at the base of Level 1. The bases of the rocks were all within 1 cm of each other in depth. They appeared to be resting on a surface; i.e. they were not jumbled or at angles. Test Unit 4 was excavated adjacent to and to the east of Test Unit 3. This test unit was excavated in one level and to the same depth below ground surface as Test Unit 3. The sandstone rocks continued in the unit. One lithic artifact and one groundstone fragment were recovered from the level. This anomalous rock concentration was designated Feature 6. Feature 6 is a concentration of 30 sandstone rocks and one pecked and ground sandstone metate (Figure 6.6). The metate forms the western end of the rock concentration. The rocks were all sandstone and the base of the rocks were within 1 - 2 cm of the same depth (Figure 6.7 and Figure 6.8). It appears that the feature is positioned on a prehistoric use surface. Feature function is unknown, but the rocks were not fire-cracked nor was there evidence for burning; therefore, the feature is not directly associated with heating or cooking functions. Perhaps it is part of some kind of work surface associated with grinding activities or represents residuum from clearings of the use surface.

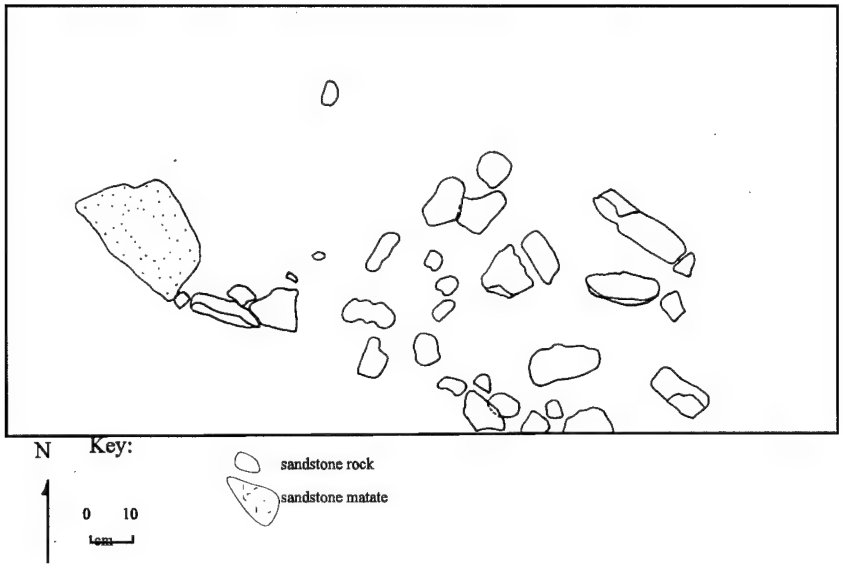

Figure 6.6 Feature 6, Test Units 3 and 4 5LA3347.

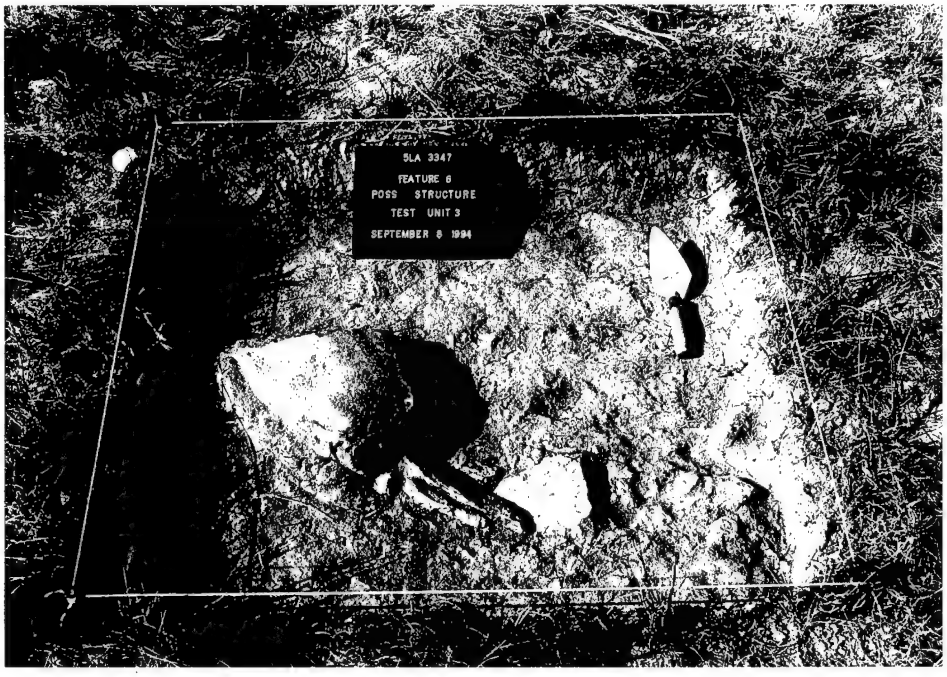

Figure 6.7 Feature 6, Test Unit 3, 5LA3347.

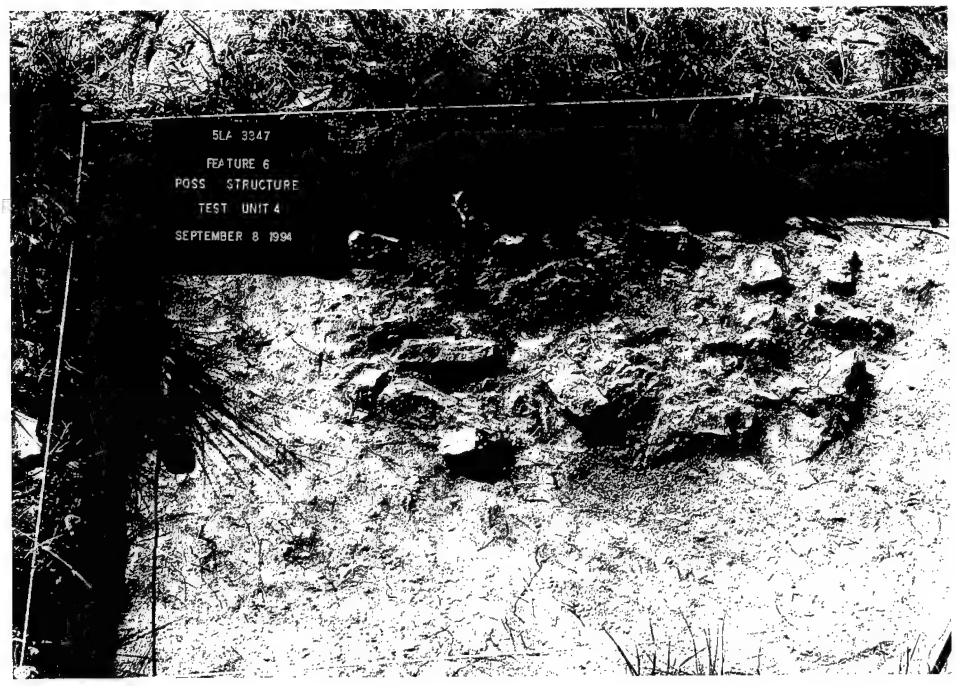

Figure 6.8 Feature 6, Test Unit 4, 5LA3347.

Stratigraphy. Profile drawings were completed of the south and west walls of Test Unit 3 and Test Unit 4. Figure 6.9 is a profile of the south wall of Test Unit 4. The stratigraphies of both units are identical. Two shallow strata were identified in these profiles, and they are described below.

Stratum 1 is a loose, granular brown (10YR 5/3) silt loam with sand. Sandstone and caliche gravel with larger angular sandstone are present in the stratum along with an occasional artifact. Reaction of the sediments with hydrochloric acid is strong. Eolian and residual sediments form this shallow (< 5 cm) Soil "A" horizon. The lower boundary is clear.

Stratum 2 is a granular to massive, brown (10YR 5/3) eolian silt loam grading to a residual sand. Caliche gravel with larger angular sandstone are present along with flakes and groundstone artifacts. Sediments react strongly with hydrochloric acid. This is the top of a weak Soil "B" horizon.

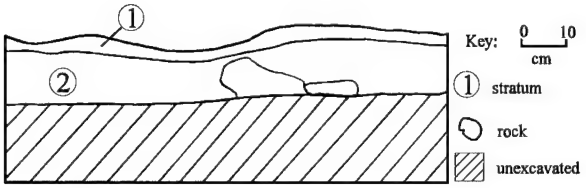

Figure 6.9 South wall profile, Test Unit 4, 5LA3347.

Test Unit 5. Test Unit 5 was excavated in Concentration 2 at the far northeast edge of the site where shovel tests in the concentration demonstrated that artifacts were buried beneath as much as 30 - 40 cm of sediments. A test unit in the area might identify a buried cultural horizon. The test unit was excavated in four levels within one stratigraphic layer (Table 6.7). Lithic artifacts were recovered from all four levels. Levels 1 and 3 produced about equal numbers of artifacts while Levels 2 and 4 showed a significant decrease over the above levels. Assuming that no major depositional processes have occurred at the site that would cause mixing of natural and cultural strata, it is conceivable that the concentrations of artifacts in Levels 1 and 3 represent separate cultural horizons. Angular sandstone, some possibly fire-cracked, were concentrated in Level 3. The sandstone decreased in Level 4 but continued to the top of a caliche and sandstone gravel stratum.

Table 6.7 Results of Test Unit 5, 5LA3347, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	10 cm	6 lithic artifacts 2 lithic tool fragments
1	2	20 cm	1 lithic artifact 2 lithic tool fragments
1	3	30 cm	2 lithic artifacts 3 lithic tool fragments
1	4	40 cm	3 lithic flakes

Stratigraphy. Three strata were identified in the north and east walls of the unit (Figure 6.10). These strata are described below.

Stratum 1 is a dark, yellowish brown (10YR 4/4), sand loam. Pedogenic structure is granular. It is a residual and eolian deposit with a strong reaction with hydrochloric acid. The stratum contains artifacts, roots and other organic materials, and large and small angular sandstone. This is the Soil "A" horizon. The lower boundary is clear.

Stratum 2 is a dark, yellowish brown (10YR 4/4) sandy loam. It is loose and granular. It is composed of residual sands with some eolian silts. Lithic flaking debris, fire-cracked rock, and large and small angular sandstone are concentrated toward the bottom of the stratum. Reaction with hydrochloric acid is less compared to Stratum 1. Lower boundary is clear. This is the Soil "B" horizon.

Stratum 3 is a structureless, dark yellowish brown (10YR 4/4) sandy loam. Artifacts continue in the unit, but decrease noticeably from Stratum 2. An occasional larger, angular sandstone cobble is present among the predominantly gravel and pebble-size caliche and sandstone. This is the top of the culturally sterile layer, and the beginning of the weathered bedrock or "C" horizon.

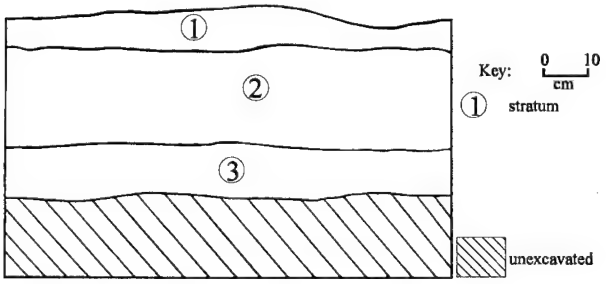

Figure 6.10 East wall profile, Test Unit 5, 5LA3347.

ANALYSIS AND INTERPRETATION

Site 5LA3347 is defined as an open, lithic and ground stone scatter that overlooks the north rim of Taylor Canyon. Lithic artifacts are numerous and primarily concentrated in two discrete loci. Several enigmatic surface features are present. These features are categorized as: (1) fire-cracked rock and gray sediment stains; and (2) concentrations of axe-cut juniper limbs. A sample of both feature categories was investigated with subsurface tests, but little information was garnered from these tests concerning the origin or function of the features. Certainly the axe-cut juniper limbs are historic. An historic dry-laid, slab sandstone structure surrounded by a light scatter of early or mid-20th century artifacts is located only 100 meters from the site and described in the site form for 5LA3346. The axe-cut brush and metal hinge from the surface could be related to this historic component at 5LA3346.

Several possible prehistoric temporal components may be inferred from the surface projectile point assemblage. Four projectile points have been collected from the site: three during inventory (Appendix IV) and one during eligibility testing. Projectile point 3347.53 is described as a representative of category P29 (Lintz and Anderson 1989). They describe this point type thus:

> *...points are asymmetrical with reworked blades. One tip has been reworked into a graver. Although most blades are basically triangular, considerable variability exists in blade shape, possibly due to reworking. The tips are dull to sharp, blade edges are convex, shoulders are abrupt to weakly barbed, stems are straight to expanding, tangs are rounded to pointed, and the bases are slightly convex. Haft elements are unground, blades are unserrated, and the points are biconvex in cross-section. These points are consistent in their size and their basic shapes*
>
> (Lintz and Anderson 1989:146).

This point is manufactured from basalt. Lintz and Anderson provide several comparable specimens recovered from the northwestern Plains and from Colorado, and they imply a tentative date range between 500 B.C. and A.D. 600 for this point category.

A second point, 5LA3347.74 is a crude corner-notched variety manufactured from a coarse-grained Dakota quartzite. Lintz and Anderson do not refer to this point in their discussion of PCMS projectile points. The original surveyors considered the artifact as a projectile point preform, perhaps because it is rather thick and crudely flaked. However, it is not convincing that this artifact is a preform; it possesses well-defined side notches. It is similar in morphology to Apishapa points from the region (Gunnerson 1987), and is assigned a Late Prehistoric to Ceramic Period affiliation.

The third point recovered from the inventory, 5LA3347.21, is a very small, triangular chert point. It is an example of Category P48 (Lintz and Anderson 1989). This particular point is the smallest from the sample. The authors provide the following category description:

> *These small triangular projectile point have sharp to very sharp tips, straight to convex blade edges, no shoulders or stems, rounded to pointed tangs, and convex bases. The blades are slightly serrated (75%) and unserrated (25%). Haft elements are unground and the points are biconvex in cross-section. The group is variable in size and blade shape*
>
> (Lintz and Anderson 1989:170).

The authors provide a wide range of comparable examples from the literature, many of which are from dated contexts (Lintz and Anderson 1989: Table 4:10:171-172). Although no associated chronometric dates were obtained from the PCMS for this point category, Lintz and Anderson give the date range of A.D. 500 to A.D. 1400 and most commonly between A.D. 1000 and A.D. 1400, based on dated examples in the literature (Lintz and Anderson 1989: 171).

A fourth point, 3347.0.84.10 (Figure 6.11), was collected from the surface during eligibility testing. The tip and base of the point are broken; however, enough remains of the point to identify it as a large, stemmed dart point, probably of Middle Archaic affiliation. It is manufactured from banded Dakota quartzite. The point is unrefined with uneven flaking. This uneven flaking may result from the flaking properties of the quartzite. This point may be defined as Category P7 under the Lintz and Anderson (1989) analysis categories for the PCMS. Their description is provided below:

> *These asymmetrical points have dull to sharp tips, straight to convex blade edges, abrupt to weakly barbed shoulders, straight to slightly contracting stems, rounded tangs and straight to convex bases. Stem length is variable. The haft elements are unground, the blades are unserrated, and the points are either biconvex (91%) or plano-convex (9%) in cross-section. The flaking pattern is random and some blade surfaces are unflaked .*
>
> Lintz and Anderson (1989:121).

A temporal range of 3000 B.C. to 1000 B.C. is given to this category by Lintz and Anderson (1989: 121).

The total number of artifacts recorded from the testing phase is 172. Surface artifacts number 123 and subsurface artifacts number 49. The total artifact assemblage is comprised of one historic artifact (a metal hinge), 15 groundstone artifacts, and 156 lithic artifacts. The groundstone at the site consists of sandstone metate and mano fragments, one complete mano, and one complete metate. Twenty-four flaked lithic artifacts are categorized as tools (14 from the surface and 10 from the subsurface). Most of the lithic tools consists of utilized and retouched flakes, core fragments, core tools, and broken bifaces. One projectile point was collected from the surface during eligibility testing. This projectile point is typed as a Middle Archaic stemmed variety .

Lithic debitage from both surface and subsurface contexts were separated into four debitage categories: complete flakes, broken flakes, flake fragments, and debris (Sullivan and Rozen 1985). The numbers and percentages represented in each category are provided in Table 6.8. The highest percentage of lithic debitage occurs in the flake fragment category, followed by debris. The high percentages of flake fragments and debris is indicative of intensive core reduction and tool manufacture (Sullivan and Rozen 1985). The inhabitants were bringing

blanks to the site along with the reworking of existing tools. It is of interest that the percentage of complete flakes between the surface and subsurface contexts is quite noticeable, and the results are used to support the assumption within our debitage analysis that post-occupational breakage did not play a major role in the percentages of debitage categories represented at the site. If breakage were a problem at these sites, it would result in lower numbers of complete flakes from the surface and higher numbers subsurface. In this example, the percentage of complete flakes from the surface is greater than the percentage from the subsurface. This

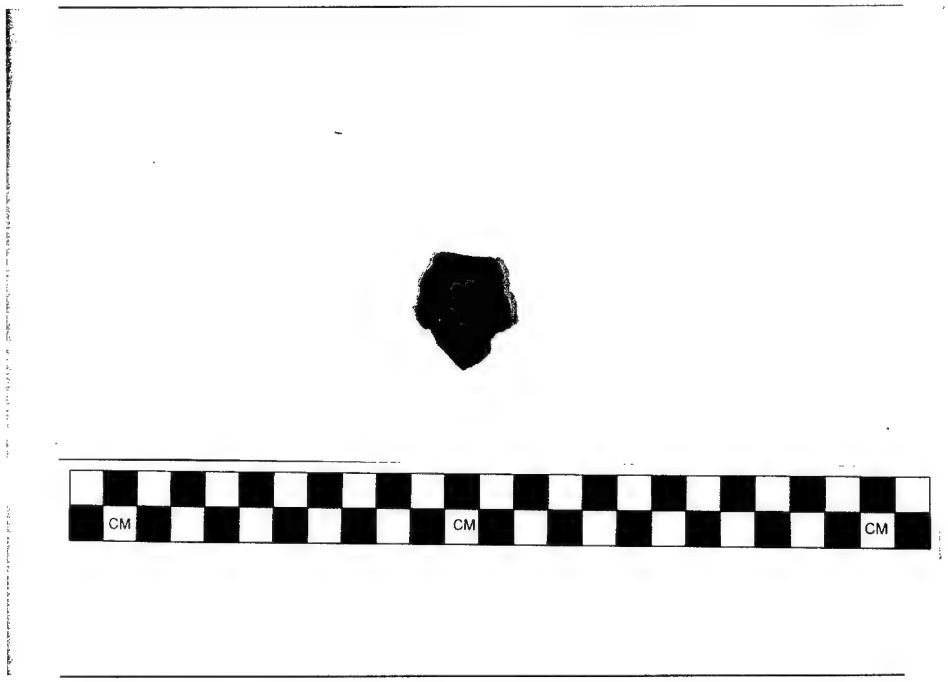

Figure 6.11 Projectile point collected from surface, 5LA3347.

difference between the two vertical contexts may be explained as spatial and possibly as temporal variability. The site covers a large area along the top of the mesa. Artifacts appear to be arranged in discrete concentrations that can be interpreted as the material remains of specific behavioral activities. The range in projectile points obtained from the site suggests that the site was used over a relatively long period. Although the site location was utilized over a broad period of prehistory, it lacked evidence for long-term, sustained habitation such as definitive habitation structures.

Table 6.8 Nontool lithic debitage, 5LA3347, PCMS.

Complete		Broken		Fragment		Debris		Total		
N	%	N	%	N	%	N	%	N	%	
22	22.9	12	14.4	32	33.3	30	31.3	96	100	Surface
1	2.8	7	19.5	17	47.2	11	30.6	36	100	Subsurface
23	17.4	19	14.4	49	37.1	41	31.1	132	100	Total

The lithic artifacts were divided into raw material categories (Table 6.9). The categories used are those defined by Ahler (1992) for the PCMS.

Table 6.9 Lithic raw material types, 5LA3347.

Quartzite		Chert		Argillite		Basalt		Hornfels		Chalcedony		Sandstone	
N	%	N	%	N	%	N	%	N	%	N	%	N	%
93	59.2	23	14.7	20	12.7	15	9.6	4	2.6	1	0.6	1	0.6

The preponderance of quartzites and cherts in this assemblage is viewed as a reliance on locally available lithic sources. The basalt, hornfels, and chalcedony can be obtained from stream gravel in the Purgatoire River and its tributaries. Argillite makes up a greater percentage of the raw material types than from other sites testing during this project, i.e., 5LA4632. This can be explained by the site's proximity to the Hogback; site 5LA3347 is closer to the Hogback, the source of argillite, than are the majority of sites from this testing project.

Three sandstone groundstone artifacts were recovered during subsurface testing. These artifacts include two small groundstone fragments and a nearly complete slab metate. The metate was slightly visible from the surface and rested on the surface elevation of Feature 6; it is assumed to be associated with the use of the feature. It measures 30 cm (incomplete) long, 22 cm wide and 7 cm thick. Pecking and grinding are present on one side only. The presence of groundstone suggests that plant and animal processing were important activities conducted at the site.

Results of subsurface testing demonstrated the presence of buried artifacts and an associated use surface with remains of groundstone and an amorphous rock feature. Sandstone bedrock was not encountered in the units with the rock feature, and this grouping of sandstone

rocks is not readily explained as a natural occurrence; therefore, it is considered to be of a cultural origin. Furthermore, the surface on which these rocks rest is interpreted to have been utilized as an activity surface. Test Unit 5 in Concentration 2 produced artifacts buried to 40 cm below the ground surface, and a probable cultural horizon between 30 and 40 cm below the surface. It is possible that the surface artifacts here represent another cultural horizon. Continued excavation could provide temporal components in good stratigraphic context.

CONCLUSIONS

Eligibility testing at this site consisted of mapping over 120 surface artifacts and excavating 33 shovel tests and 5 test units. The results from eligibility testing and the original site inventory were used to determine criteria for site significance. Site 5LA3347 has produced a relatively large sample of surface and subsurface artifacts. These include flaked and ground stone artifacts, projectile points, bifacial and unifacial tools, and utilized flakes. The projectile points recovered from the site suggest multiple temporal occupations ranging from 3000 B.C. to A.D. 1400, while the variety in tool types might imply plant and animal processing and tool manufacture. Rock features are of two types - burned and unburned. This site was occupied perhaps over a long period of prehistory, and may have served several functions throughout the course of occupation; however, our testing did not produce clear evidence for sustained long-term usage such as habitation structures. At least one cultural horizon and one use surface were identified in subsurface excavations. The site has yielded significant information about the prehistoric occupation of the PCMS. It is recommended that the site be considered eligible for nomination to the NRHP under Criterion D.

CHAPTER 7

5LA3570

INTRODUCTION AND LOCATIONAL INFORMATION

Eligibility testing at 5LA3570 was conducted at 5LA3570 from August 28 through Augusut 30 and September 7, 1994. A total of 22 person days were spent at the site. Work completed at the site consisted of EDM mapping of surface artifacts and features, field analysis of surface artifacts, and the excavation of four test units A section of the cutbank along Lockwood Arroyo was examined for a more detailed geoarchaeological assessment. One eroding hearth feature (Feature 11) was partially excavated and subsequently stabilized. The results of field and laboratory analysis have demonstrated that this site is eligible for nomination to the NRHP under Criterion D: the potential to yield significant information about the prehistoric lifeways of the inhabitants of the PCMS.

Site 5LA3570 is a limited habitation and camp site with multiple temporal components. Numerous features are exposed on the site's surface. The site is located within the Arroyo/Canyon Landscape Unit (Figure 1.2) at the confluence of Lockwood Arroyo and an unnamed intermittent arroyo (Figure 1.1). The site is primarily located on an alluvial terrace west of the confluence. The terrace is southwest of the southern end of a large southerly loop of Lockwood Arroyo that is located roughly 7.5 miles (12 km) upstream and to the northwest of the Purgatoire River. The loop is approximately 750 m long and 300-700 m wide. The intermittent arroyo forms the southern site boundary and a portion of the eastern site boundary. Lockwood Arroyo forms the remainder of the eastern site boundary. An exposed sandstone outcrop above the terrace forms the northern and western edges of the main artifact scatter. Two rock alignments are located north of this outcrop on the rolling steppe above the terrace. Another sandstone outcrop is located south of the intermittent arroyo. These outcrops form steep cliffs where they have been eroded by Lockwood Arroyo. A smaller intermittent drainage joins the larger drainage southeast of the site where it continues eastward and converges with Lockwood Arroyo. The terrace where the site is located is flat except along the edges where erosion has formed steep cut banks and small dissected arroyos (Figure 7.1). The immediate terrain west of Lockwood Arroyo is a rolling steppe that eventually slopes upward to the west and south. This terrain varies from rolling hills and canyon rim to heavily dissected areas. The terrain east of Lockwood Arroyo is characterized as flat canyon bottomlands. Water is available from Lockwood Arroyo on a seasonal or intermittent basis. An unnamed spring is shown on the 7.5' U.S.G.S. map approximately 900 m (0.5 mi) upstream. The current condition of the spring is unknown, but other springs in the area have provided a more stable water source in the past. Legal descriptions and other pertinent locational information for this site are provided in Table 1.1. Figure 7.2 is a map of the site showing topographic details, site boundaries, features, and subsurface excavations.

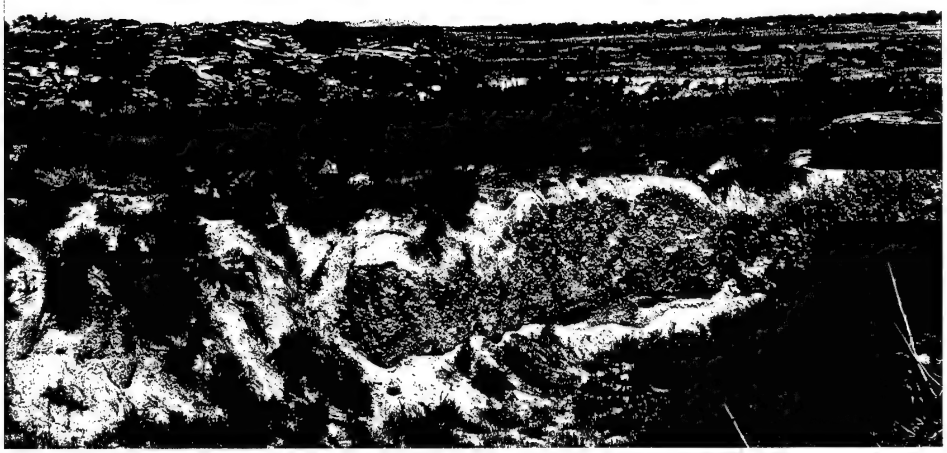

Figure 7.1 General site overview, 5LA3570, from across unnamed drainage. View to the north.

SITE SETTING

Geology

The bedrock geology is Lower Cretaceous Dakota Sandstone. This sandstone gently slopes to the southeast. Lockwood Arroyo has eroded the sandstone bedrock exposing layers of clay and shale. The main site area is situated on a thick remnant of recent alluvium-overbank sediments from Lockwood Arroyo. A thin layer of lag gravel is present at the eastern edge of the site. This lag gravel consists of subrounded to subangular sandstone, shale, and siltstone. The gravel was deposited when flow from Lockwood Arroyo was greater than the present flow. The location of the site at a drainage confluence makes it highly suspectible to alluvial cutting and filling sequences.

Soils

The soils at the site are mapped as Travessilla-Wiley-Villagreen (U.S.S.C.S. 1983). The stratigraphic profile from the excavation and cutbank profiles reveals two primary soil strata. The upper stratum is a brown (10YR 5/3) silty sand that varies in thickness from 6 cm to 60 cm. This stratum is thicker on the more open alluvial terrace and thinner near the sandstone outcrop. The second stratum is a brown (10YR 5/3 and 4/4) to yellow brown (10YR 5/4 to 4/4) silt loam.

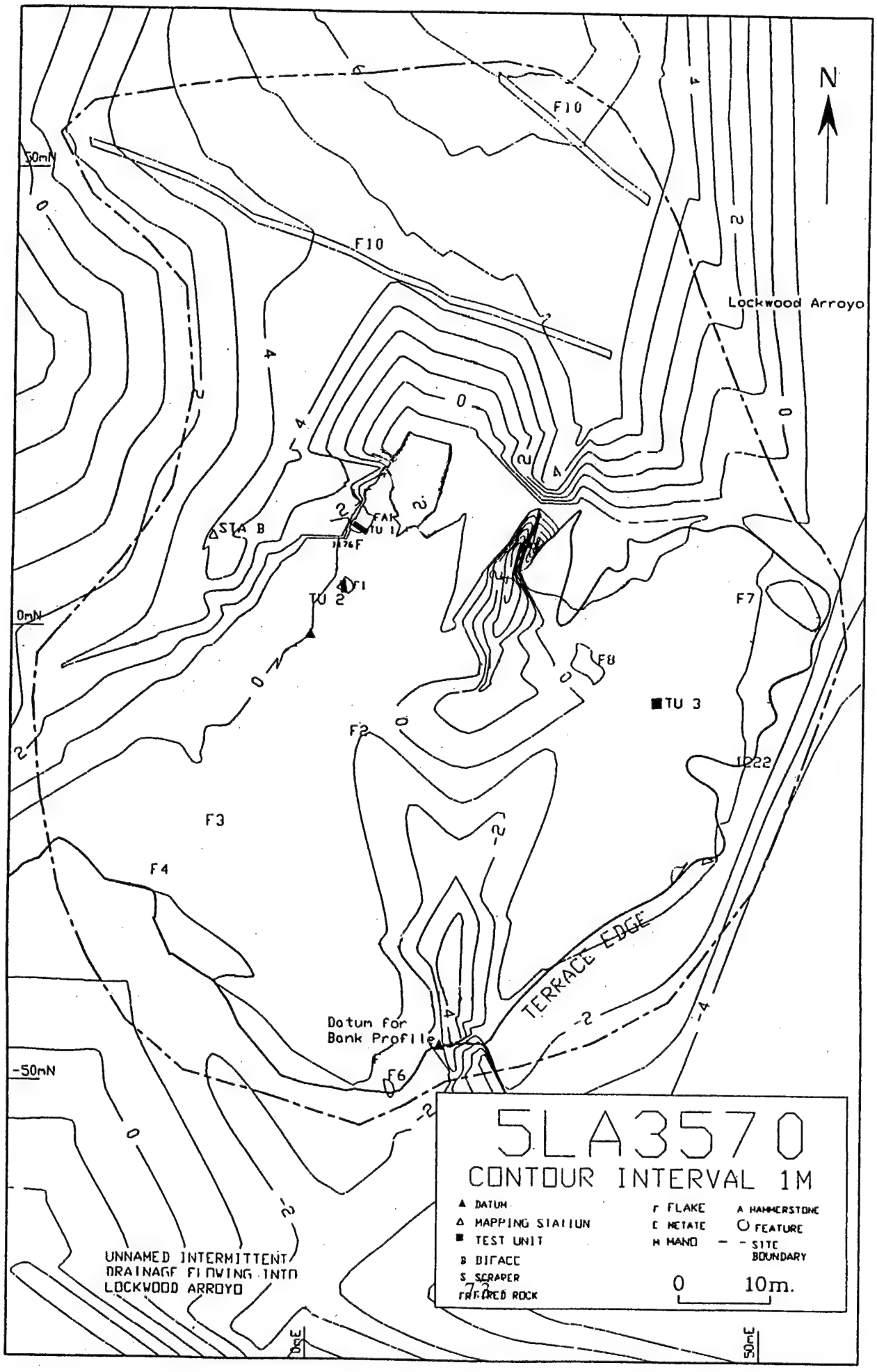

Figure 7.2 General site map, 5LA3570.

Vegetation

Both scrubland and grassland environmental zones are represented in the immediate site area. The alluvial terrace and the canyon bottoms are dominated by scrubland species, while the higher steppe areas are dominated by grassland species with an occasional juniper. Identified flora at the site include saltbrush, rabbitbrush, prickly pear, Russian thistle, plantago, cholla, sagebrush, skunkbush, buckwheat, goldenweed, and prickly lettuce. Grasses present include grama, wheatgrass, cheatgrass, Indian rice grass, and wild rye.

PREVIOUS SURVEY RESULTS

5LA3570 was originally recorded in August of 1984 by archaeologists from the University of Denver during the Phase I inventory of Area C, Fort Carson-Pinon Canyon Cultural Resource Project (Colorado State Site Form, 5LA3570). At that time, the archaeologists believed the site possessed a high research potential based on the presence of exposed hearths and possible structural remains. Due to the position of the site on an eroding terrace, immediate salvage excavation was recommended The archaeologists stressed the importance of addressing those features that were believed in imminent danger from erosion. A 100 percent surface artifact inventory resulted in the collection of 55 flaked and ground stone artifacts. This artifact assemblage included two slab metates, three metate fragments (not collected), three mano fragments, one hammerstone, two cores, four retouched flakes, seven utilized flakes, twenty-two lithic artifacts, two shell fragments, one biface tip, and one complete projectile point (Appendix IV). This projectile point (Category 68) tentatively dates from A.D. 800 to ca. A.D. 1350 (Lintz and Anderson 1989:304-305).

Aside from the site inventory and surface collection by the University of Denver, the site received no further archaeological work except for protective measures (marking the site off limits and periodic inspection) until the eligibility testing conducted by Fort Lewis College.

RESULTS OF ELIGIBILITY TESTING

Surface Reconnaissance

Initial site assessment succeeded in locating the original rebar datum. This datum was used by Fort Lewis College. Pedestrian transects were surveyed across the site using the terrace edges as transect boundaries. The terrace cut banks and the arroyos were examined separately. All observed surface artifacts were pin flagged, field analyzed (Table 7.1), and mapped with the EDM (Figure 7.3). Fifty-eight artifacts including forty-three pieces of lithic debitage, three retouched flakes, one utilized flake, one hammerstone, one core, one biface, one projectile point,

Table 7.1 Surface artifacts, 5LA3570, PCMS.

Map Number	Artifact Type	Flake Type	Material Type
154	Flake	Complete	Chert
155	Metate Fragment	NA	Sandstone
156	Metate Fragment	NA	Sandstone
157	Metate Fragment	NA	Sandstone
158	Metate Fragment	NA	Sandstone
159	Metate Fragment	NA	Sandstone
160	Debris	Debris	Quartzite
161	Debris	Debris	Quartzite
162*	Biface	NA	Chalcedony
163	Flake	Fragment	Quartzite
164	Flake	Fragment	Argillite
165	Debris	Debris	Chert
166	Retouched Flake	NA	Chert
167	Hammerstone	NA	Sandstone
168*	Retouched Flake	NA	Chert
169	Flake	Fragment	Silicified Wood
170	Flake	Broken	Quartzite
171	Metate Fragment	NA	Sandstone
172	Flake	Broken	Chert
173*	Chopper	NA	Quartzite
174	Debris	Debris	Chert
175	Flake	Broken	Basalt
176	Flake	Fragment	Quartzite
177	Flake	Fragment	Silicified Wood
178	Flake	Broken	Quartzite
179	Debris	Debris	Chert
180	Flake	Fragment	Quartzite
181	Flake	Fragment	Quartzite
182	Utilizied Flake	NA	Quartzite

Map Number	Artifact Type	Flake Type	Material Type
183	Flake	Broken	Quartzite
184*	Projectile Point	NA	Quartzite
185	Debris	Debris	Chert
186	Debris	Debris	Quartzite
187	Retouched Flake	NA	Quartzite
188	Flake	Complete	Quartzite
189	Debris	Debris	Argillite
190	Flake	Complete	Argillite
191	Flake	Broken	Argillite
192	Debris	Debris	Argillite
193	Flake	Fragment	Chert
194	Flake	Broken	Chert
195	Debris	Debris	Argillite
196	Debris	Debris	Argillite
197	Flake	Complete	Quartzite
198	Debris	Debris	Argillite
199	Debris	Debris	Chert
200	Debris	Debris	Argillite
201	Debris	Debris	Chert
202	Debris	Debris	Argillite
203	Metate Fragment	NA	Sandstone
204	Debris	Debris	Argillite
205	Debris	Debris	Chert
206	Flake	Broken	Chert
207	Flake	Broken	Chalcedony
208	Debris	Debris	Quartzite
209	Debris	Debris	Quartzite
210	Flake	Complete	Chert
211	Flake	Complete	Quartzite

*Collected

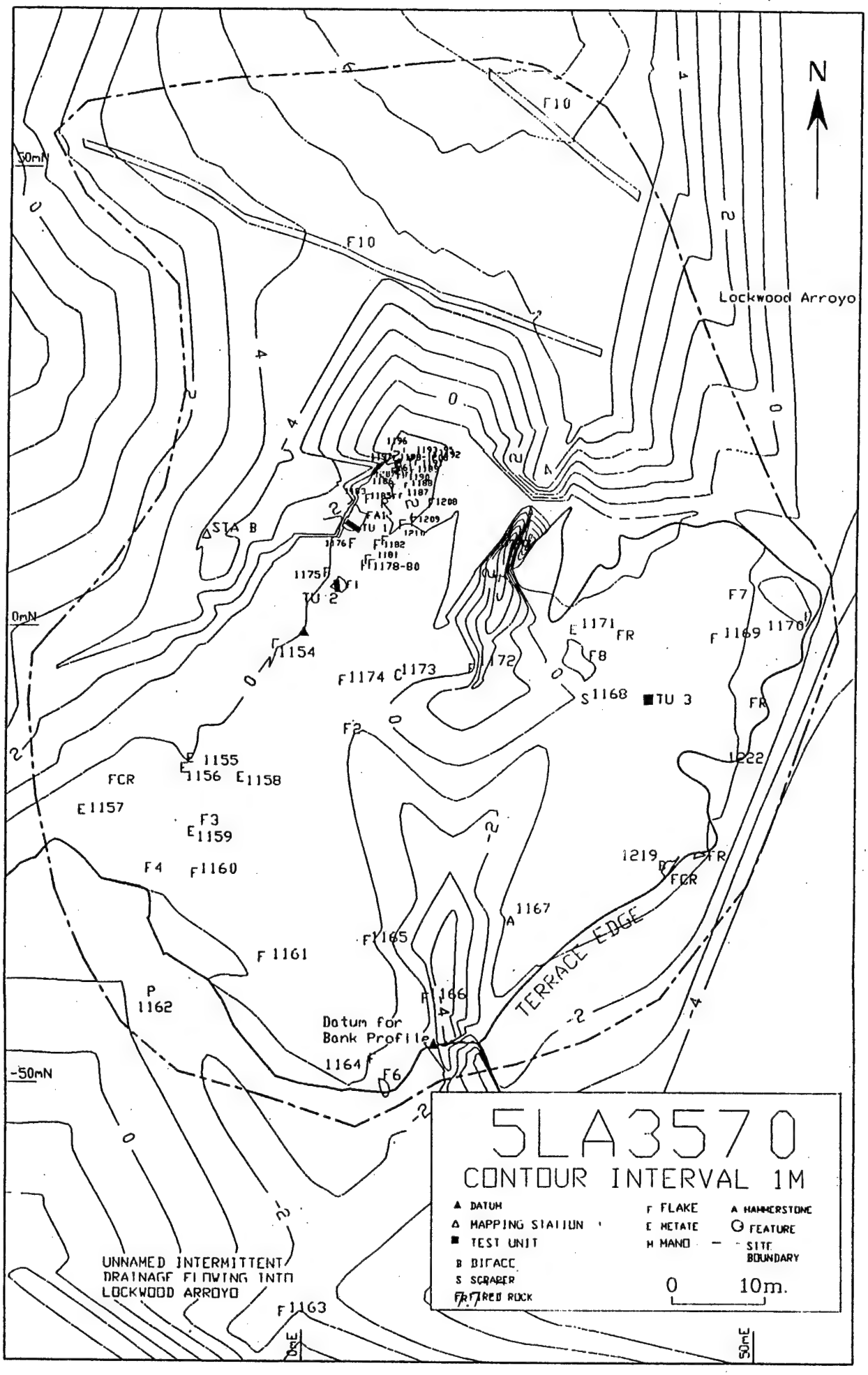

Figure 7.3 General site map with surface artifacts, 5LA3570.

and seven metate fragments were identified. The projectile point, the biface, the core, and one of the retouched flakes were collected by Fort Lewis. With the exception of two metate fragments, artifacts presumably have been exposed since the original recording.

Features 1 through 6 and one stone enclosure (Structure A1) were noted when the site was initially recorded by the University of Denver. In addition to these seven features, four additional features were identified numbered by Fort Lewis. All features locations are shown on Figure 7.2 and Figure 7.3.

Structure A1 was recorded as a stone enclosure constructed of ten sandstone slabs and angular boulders against the sandstone outcrop. One slab was vertical, and the remainder were horizontal. The enclosure was remapped and photographed (Figure 7.4). The vertical sandstone slab was still in place, and the general outline of the enclosure remained intact. However, two slabs appear to have moved, and another slab was partially buried suggesting that minor erosion had affected the enclosure.

Feature 1 was recorded as a hearth consisting of nineteen sandstone slab and subangular

Figure 7.4 Structure A1, 5LA3570. View to the northeast.

pieces that formed a four-sided interior area. The feature was remapped and photographed (Figure 7.5). Other than minor sheetwash erosion, the feature appears intact.

Feature 2 was recorded as a burned rock concentration comprised of 40 to 50 pieces of burned and unburned sandstone covering an area of 1.28 meters. The feature was remapped and

Figure 7.5 Feature 1, 5LA3570. View to the north.

photographed. Although it appears that most of the larger rocks remain in place, many of the smaller sandstone rocks have apparently been displaced by sheetwash.

Feature 3 was recorded as a burned rock feature consisting of sixteen pieces of burned and unburned sandstone that covered an area 1.35 m x 0.63 m. Currently 12 pieces of sandstone are present and are spread over an area 4 m x 2 m. The feature is on the west slope of a small arroyo. Erosion from sheetwash is quite obvious.

Feature 4 was recorded as a burned rock concentration with a small (36 cm x 40 cm) ash stain in the center. Approximately 130 burned sandstone rocks were observed. The recorded dimensions were 88 cm x 88 cm. The size of the feature appears to have changed little from the initial recording, although the number of sandstone rock observed is now closer to 50 pieces.

Feature 5 was recorded as a concentration of 30 pieces of burned sandstone and shale covering an area 1.05 m x 0.68 m. This feature was not relocated. A small erosional drainage is present where the feature was originally located, and it is likely that the feature has completely eroded; the result of sheetwash and gullying.

Feature 6 was recorded as a large concentration of burned sandstone containing approximately 100 rocks. A small ash deposit was noted near the center of the feature. The

feature covered an area 2.28 m x 1.18 m. The feature was previously described as heavily deflated. The feature was relocated and photo-graphed (Figure 7.6). It appears that the feature has suffered more damage since the original recording. It now covers an area 4 m x 3 m, and recent erosion has exposed an additional 50 pieces of sandstone.

Figure 7.6 Feature 6, 5LA3570. View to the north.

The following are new features recorded by Fort Lewis College during eligibility testing. Feature numbers assigned to the new features follow in sequence those used by the University of Denver.

Feature 7 is located at the extreme eastern edge of the site near the terrace edge. It consists of a small concentration of 12 pieces of burned sandstone. The feature measures 1 m east and west and 0.3 m north and south. Charcoal or ash was not observed on the surface. The integrity of this feature is suspect due to the surrounding gully erosion along the terrace edge.

Feature 8 is also located in the eastern edge of the site, but currently it is in a more stable area of the terrace than Feature 7. The feature consists of a concentration of 12 large unburned sandstone rocks in an area measuring 6 m x 6 m (Figure 7.7). The smallest sandstone rock measures 10 cm x 20 cm, and the largest piece measures 25 cm x 75 cm. Five of the pieces of sandstone form a fairly straight east to west line with a 10cm to 20 cm spacing between individual rocks. The remainder of the sandstone is scattered to the north and west. The function of the feature is unknown. Although artifacts were not located within the feature proper, lithic artifacts and burned sandstone were found in the general vicinity.

Figure 7.7 Feature 8, 5LA3570. View to the southeast.

Feature 9 is a midden deposit located near the stone enclosure (Figure 7.8). Although this area exposed the greatest number of artifacts at the site, both during the initial recording and in the subsequent testing phase, it was not given a feature number during the original survey. The sediments have an ashy appearance with a light scatter of burned sandstone, groundstone, charcoal, and lithic artifacts. Two projectile points were collected from the feature, one during

the original site inventory by the University of Denver, and one during site testing. The feature extends northward from Structure A1 along a narrow portion of the terrace. The feature is

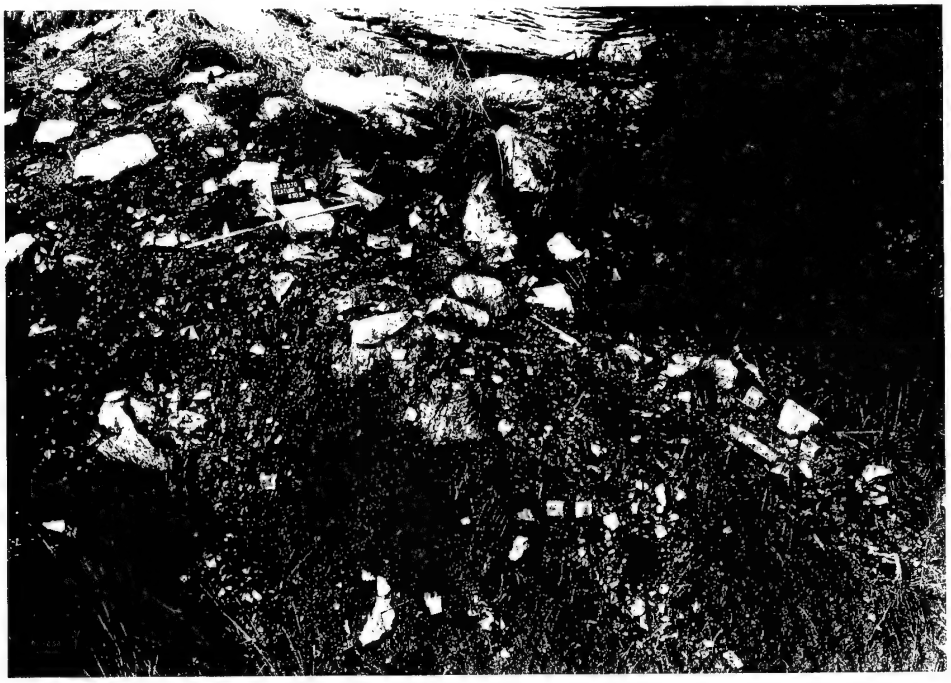

Figure 7.8 Feature 9, 5LA3570. View to the southwest.

bounded by an arroyo cut to the east, and the west side abuts the sandstone bench face. The north side is bounded by Lockwood Arroyo. Cultural material is located on the top of the terrace and along the smaller arroyo channel into Lockwood Arroyo. The erosional channel is shallow near Structure A1, but deepens as it slopes to the arroyo. The feature measures 10 m north and south and 6 m east and west.

Feature 10 is located above the alluvial terrace along the rolling steppe to the north. The feature consists of two rock alignments constructed of angular sandstone. The alignments are roughly parallel to each other. The southern most alignment is less than 20 meters north of the edge of the lower alluvial terrace. This alignment is the better defined of the two (Figure 7.9, Figure 7.10). It extends for nearly 60 meters in a west to northwest direction from the edge of a sheer cliff face overlooking Lockwood Arroyo. It ends where the sandstone outcrop forms the edge of a small drainage that carries runoff from the higher areas of the steppe. A three-meter

section of the alignment appears to have been moved out of the way to provide vehicular access to the terrace area and the arroyo. The second alignment measues 20 m, and it is located roughly

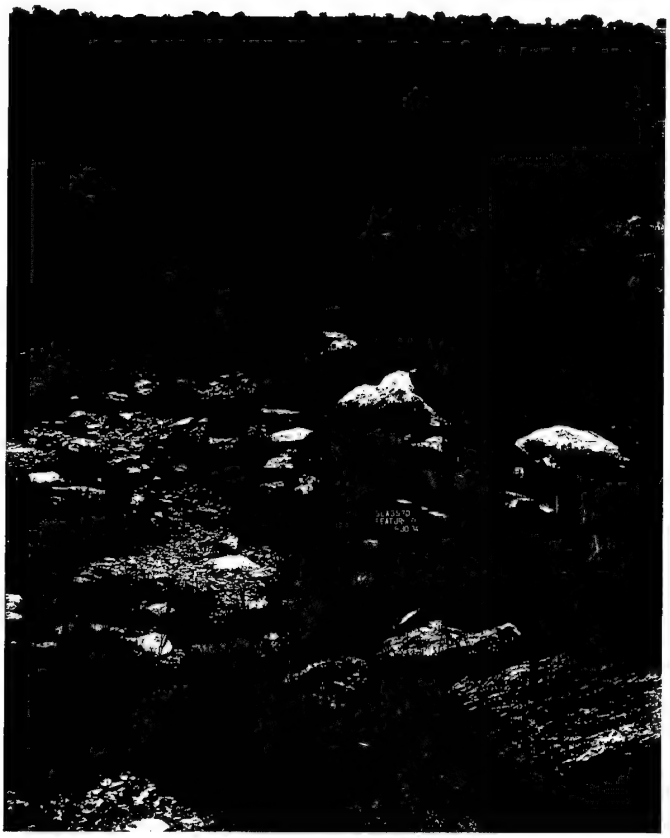

Figure 7.9 Feature 10, southern alignment, 5LA3570. View to the west.

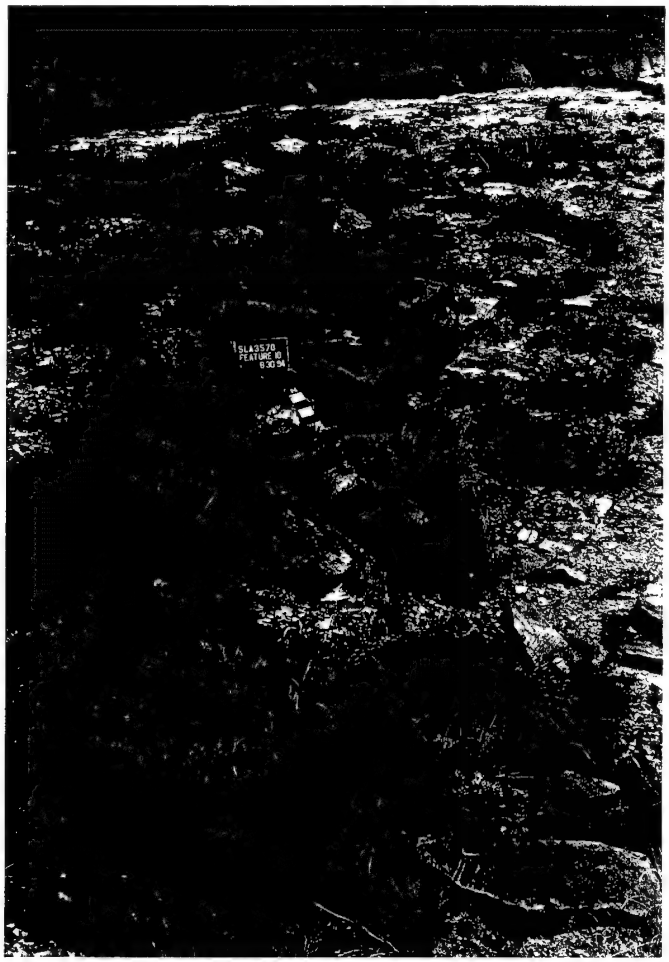

Figure 7.10 Feature 10, northern alignment, 5LA3570. View to the east.

20 m upslope from the other alignment. It extends northwest from the sheer cliff face to a sandstone outcrop near the crest of a small knoll on the steppe. The sandstone used to construct the alignments are both rounded and tabular and measure one meter across, although the majority of the sandstone used are less than half that size. Several pieces of sandstone are at angles and may have been upright at one time (Figure 7.11). Material for the alignments is readily available along the steppe. The alignments converge in a funnel near the cliff where they form a funnel-shaped feature. This feature is definitely man-made, but it does not appear to have been constructed with machines. The location of the alignments extending to the cliff edge discounts the possibility that it was an historic road. The absence of historic artifacts such as wire, nails, or

hewn posts precludes its being used as a livestock pen or fence. Currently, the feature is interpreted as a game drive. Although no game drives have been identified in the PCMS, prehistoric rock art perhaps depicting game drives is present in the PCMS (Loendorf and Kuehn 1991).

Figure 7.11 Feature 10, vertical sandstone slabs, 5LA3570. View to the north.

Feature 11 is a hearth exposed along the east side of the small arroyo across from the midden, Feature 9. This feature was discovered near the end of testing activities at the site. It may have been exposed by heavy rainstorms that occurred over the course of eligibility testing at the site. Due to the unstable condition of the feature, it was deemed necessary to partially excavate the feature. Efforts were then made to stabilize the remainder of the feature for future excavation. A detailed description of the feature is provided later in this chapter.

Subsurface Investigations

Subsurface testing at 5LA3570 was confined to the excavation of four test units and the partial excavation of an eroding hearth feature (Feature 11). Geoarchaeological interpretations of site stratigraphy were conducted on a vertical exposure of the alluvial terrace sediments. The locations of these investigations are shown in Figure 7.2 and Figure 7.3. Shovel tests were not conducted at this time because the maximum depth of cultural deposits was defined by the stratigraphy in the arroyo. Site boundaries were defined by the extent of the terrace. Therefore, it was decided to focus subsurface excavations in areas of possible features such as the stone enclosure, hearth feature, and midden.

Test Unit Excavations

Test Unit 1 was placed within Structure A1. The intent of this test unit was to determine if the feature was indeed a structure, and if it was a structure whether it retained its contextual integrity. Test Unit 2 was placed over the previously defined Feature 1, which was recorded as a hearth. Test Unit 3 was excavated on the open alluvial terrace to investigate and sample that area for buried deposits, and Test Unit 4 was located within Feature 9, the midden. Test unit size at this site varied from the standard 1 m x 1 m units typical of testing at other sites, and the depth of individual units varied more on this site than at other sites (Table 7.2). Unit size is explained in the test unit descriptions for each unit.

Table 7.2 Test Unit results, 5LA3570, PCMS.

Test Unit No.	Size (m)	Layers	Levels	Final Depth (bgs)
1	0.5 X 2	2	6	27 - 46 cm
2	0.5 X 1	2	4	36 - 42 cm
3	1 X 1	2	4	44 - 49 cm
4	0.5 X 0.5	1	2	18 - 21 cm

Test Unit 1. Test Unit 1 was placed across the south end of the possible stone enclosure designated as Structure A1 (Figure 7.12). The primary reason for this test unit was to determine if the overhang had been utilized by prehistoric populations. A long, narrow (2 m x 0.5 m) test unit across the feature provided a stratigraphic profile without excessive damage to the feature. A control sample measuring 0.5 m x 0.5 m was located on the west side of the test unit and adjacent to the sandstone overhang. The sample was collected for pollen and flotation analysis. The remaining fill from test-unit excavation was screened through ⅛" wire mesh. Trowels and small hand picks were used to remove the fill. The unit was excavated following the natural surface contours. After removal of the loose (2 cm) sediments from the surface, the unit was excavated in 5 - 10 cm arbitrary levels within stratigraphic levels (Table 7.3, Figure 7.13).

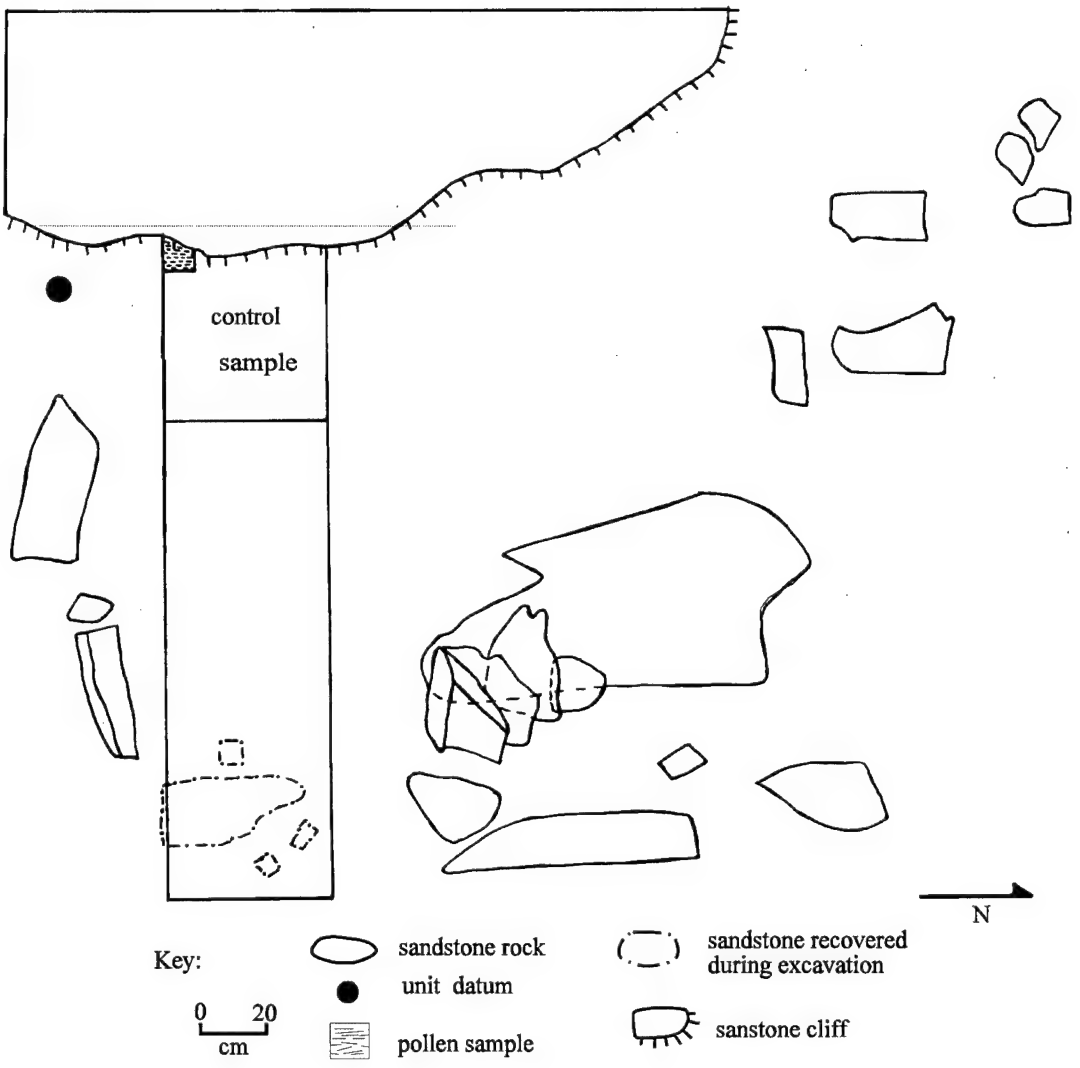

Figure 7.12 Planview of Structure A1 and Test Unit 1, 5LA3570.

Table 7.3 Results of Test Unit 1, 5LA3570, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	0 - 2 cm	9 lithic artifacts
1	2	2 - 7 cm	1 lithic artifact, shell, charcoal
1	3	7 - 12 cm	4 lithic artifacts, charcoal
1	4	12 - 17 cm	13 lithic artifacts, charcoal
1	5	17 - 27 cm	15 lithic artifacts, 3 bone, shell, 1 retouched flake, charcoal
2	1	27 - 46 cm	6 lithic flakes, charcoal, shell

Light charcoal flecking was noted in every level except for Level 1; however, oxidation was not noted in any level. Shell fragments were found in three of the six levels. The shell did not appear to be burned. The shell is most likely from fresh water bivalves. Small pieces of unidentified animal bone were recovered from all levels. Lithic artifacts were recovered from all levels. Eleven flakes and one retouched flake were recovered in the field (Layer 1, Levels 3-5). Analysis of the heavy fraction from the control sample revealed thirty-seven more lithic artifacts, many of which would have been missed by ⅛" wire mesh. Shortly after excavations began, a sandstone slab was uncovered at the east end of the unit which was thought to represent part of the rock enclosure. The slab was left in place, and excavations were conducted on both sides of the slab. The fill from the outside (east) of the slab was excavated separately from that on the inside (west). The majority of artifacts were recovered from the interior of the enclosure. By the base of Level 3, the unit was below the sandstone slab. A stratigraphic change was first noted during the excavation of Layer 1, Level 5. Twelve lithic artifacts were recovered from Layer 1, Levels 3-5 during field operations. The remaining 37 artifacts were obtained from the control sample that was processed in the laboratory.

Stratigraphy. The north and south walls were cleaned and photographed, and profiles were drawn (Figure 7.13 and Figure 7.14). Three stratigraphic units were defined and are described below.

Figure 7.13 South wall profile, Test Unit 1, 5LA3570. View to the southwest.

Stratum 1 is a brown (10YR 5/3) fine, silty sand. The structure is loose and friable. Small sandstone gravel, roots, and cultural material are present in the stratum. It is a fairly thin Soil "A" horizon developed primarily in alluvial sediments with some residual sediments. Stratum thickness varies between 8 - 24 cm. The stratum is thickest adjacent to the sandstone overhang. The lower boundary is clear and slopes slightly from west to east.

Stratum 2 is a brown (10YR 4/3) silt loam. The pedogenic structure is blocky with small peds that separate along root hairs. Compaction increases with depth in the stratum, as do sandstone gravel and caliche. Roots and cultural materials are also present in the stratum. Artifacts are primarily confined to the upper half of the stratum. The stratum is thinnest on the west side of the unit where Stratum 3 appears. The boundary is clear in the area of Stratum 3. Stratum 2, the top of a Soil " B" horizon, developed in both alluvial and residual sediments.

Stratum 3 is a dark, yellow-brown (10YR 4/4) sandy loam. Pedogenic structure is weak and friable. Small sandstone gravel were observed during excavation. No cultural material was present in the stratum. This stratum was only exposed in the northwest corner of Test Unit 1 where it rests directly against the sandstone overhang. This deposit is formed in primarily residual sediments from decomposing sandstone bedrock.

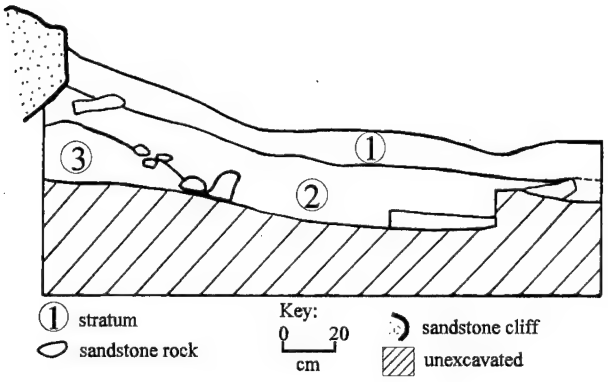

Figure 7.14 North wall profile, Test Unit 1, Structure 1A, 5LA3570.

Based on the results of this test unit, it does not appear that Structure A1 was a permanent habitation. It may have been used ephemerally, or perhpas as a storage feature, but no occupational surface was detected. The cultural materials found in the test unit may have washed in from the midden feature to the north. The strata exposed in Test Unit 1 slope from north to south and west to east. During excavation, only twelve lithic artifacts were recovered from Layer 1, Levels 3-5. The other 37 artifacts were acquired from the control sample, which was processed in the laboratory.

Test Unit 2. Test Unit 2 was located over the previously defined Feature 1, a possible hearth. A 1 m x 0.5 m test unit was set up to bisect the west half of the feature (Figure 7.15). Tabular sandstone on the surface defined the feature. A waterscreen sample (10 cm x 15 cm x 50 cm) was taken from the north end of the unit. Excavation was limited to troweling because of the density of sandstone. The sandstone was mapped at the bottom of every level and then removed.

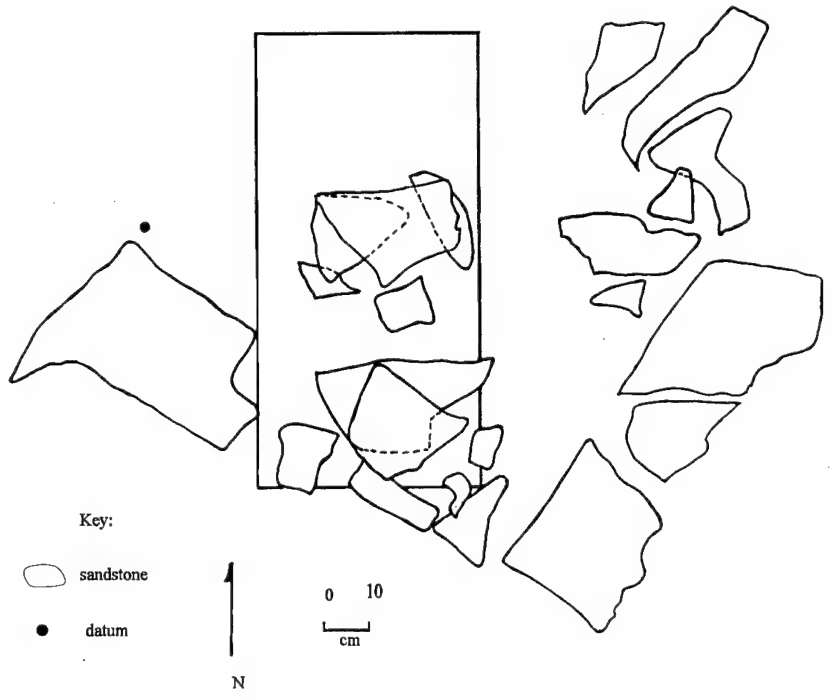

Figure 7.15 Plan view, Feature 1,Test Unit 2, 5LA3570.

Test Unit 2 was excavated in arbitrary 10 cm levels within observable stratigraphic units (Table 7.4). Two lithic artifacts and two metate fragments (which fit together) were recovered during excavation . One piece of charred wood was recovered from Layer 1, Level 1. Oxidation was not noted during excavation. Excavations were terminated at the base of Layer 2, Level 2 due to increasing amounts of caliche and decreasing amounts of artifacts.

Table 7.4 Results of Test Unit 2, 5LA3570, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	10 cm	Charred wood
1	2	20 cm	No artifacts
2	1	30 cm	2 lithic artifacts, 2 groundstone
2	2	36 - 42 cm	No artifacts

Stratigraphy The north and east walls were cleaned, photographed and profiled (Figure 7.16). Two strata were defined in the unit and are described below.

Stratum 1 is a brown, (10YR 5/3) silty sand. The structure is loose and friable. One piece of charred wood, roots, and small (5 cm) to large (30 cm) pieces of sandstone are present in the stratum. It is a thin Soil "A" horizon developed in alluvial and residual sediments. The thickness varies between 6 cm and 15 cm. The lower boundary is clear.

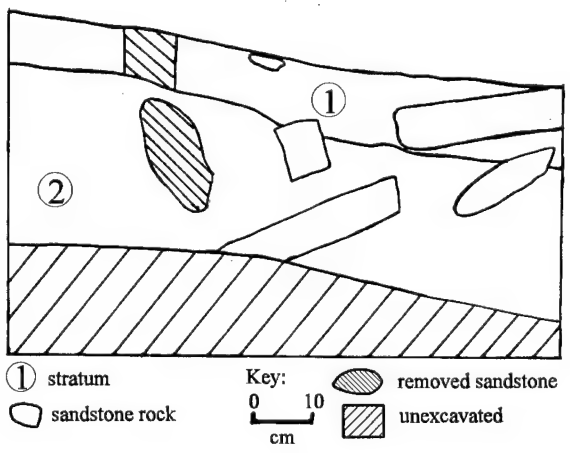

Figure 7.16 East wall profile, Test Unit 2, Feature 1, 5LA3570.

Stratum 2 is a brown, (10YR 5/3) to yellowish brown (10YR 5/4) silt loam. The pedogenic structure is blocky with small peds. This stratum becomes more compacted with depth. Caliche begins to appear about 15 cm below the ground surface. The amount of caliche gradually increases with depth. Roots and large to small pieces of sandstone are present. Cultural material is confined to the top of the stratum before the caliche intensifies. This stratum consists of alluvial and residual sediments. Excavations were discontinued after removing 24 - 34 cm of Stratum 2.

Based on the excavation of a portion of this feature, it does not appear that Feature 1 is a hearth. The sandstone as well as the metate fragments encountered during excavation were often jumbled: many sandstone rock were found on end and others at odd angles to the surface. It is possible that the feature was disturbed sometime during the recent past.

Test Unit 3. Test Unit 3 was located on the open alluvial terrace in an area where the surface appears stabilized by vegetation. Artifacts and burned sandstone are located on the surface in the immediate area. Test Unit 3 was excavated in four arbitrary 10 cm levels (Table 7.5). There were no artifacts recovered from the excavation unit. One fleck of charcoal was noted in the third level. Excavations were terminated at the base of Layer 2, Level 2.

Table 7.5 Results of Test Unit 3, 5LA3570, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	10 cm	No artifacts
1	2	20 cm	No artifacts
2	1	30 cm	1 charcoal fleck
2	2	40 cm	No artifacts

Stratigraphy The north and east walls were cleaned, photographed, and profiled (Figure 7.17). Two strata were defined and are described below.

Stratum 1 is a brown, (10YR 5/3) fine silty loam. The structure is loose and friable. Roots are present. This stratum is a thin Soil "A" horizon developed in primarily alluvial deposits with some eolian sediments. The thickness varies between 19 and 30 cm. The lower boundary is clear and slightly wavy.

Stratum 2 is a brown, (10YR 5/3) silt loam. The structure is blocky with small peds. Roots are present. This stratum is the top of a Soil "B" horizon developed

in alluvial sediments. The lower boundary is unknown. Excavations were discontinued after the removal of 18 to 30 cm of Stratum 2

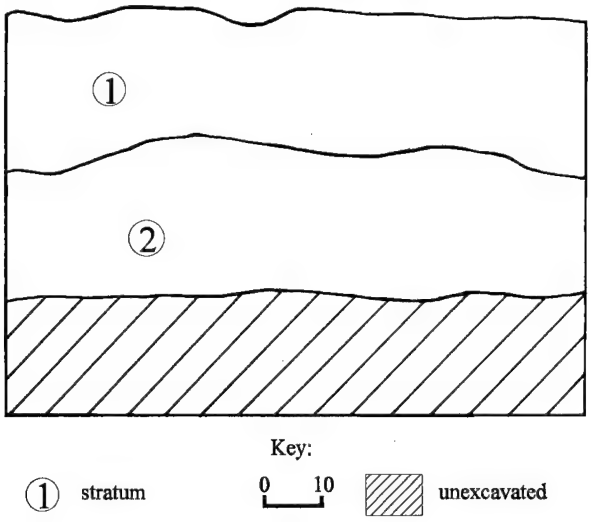

Figure 7.17 East wall profile, Test Unit 3, 5LA3570.

Excavations were terminated after four, 10 cm levels failed to produce any artifacts. Buried deposits, if they exist in this area of the site, may be deeply buried.

Test Unit 4. Test Unit 4 was located in Feature 9, the midden. The unit was placed near the location of a recently discovered projectile point found during eligibility testing. The primary reason for the excavation of this unit was to obtain a midden sample for laboratory analysis. A 0.5 m x 0.5 m test unit was excavated in two 10 cm levels (Table 7.6). Excavation stopped at the base of Level 2, because numerous pieces of sandstone precluded further excavation. These larger pieces of sandstone were not removed. A pollen sample was taken from each level; the remainder of fill was collected for flotation. Ash was noted in Level 2, and charcoal was present in both levels.

Table 7.6 Results of Test Unit 4, 5LA3570, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	2 - 10 cm	5 lithic artifacts, charcoal
1	2	20 cm	4 lithic artifacts, charcoal

Stratigraphy The north and west walls were cleaned, photographed, and profiled (Figure 7.18). Two stratigraphic units were defined and are described below.

Stratum 1 is a brown (10YR 5/3) silt. The structure is loose and friable. This stratum is a thin Soil "A" horizon developed in alluvial deposits. The thickness varies between 3 cm and 6 cm. Charcoal, roots, and numerous pieces of sandstone are present in the stratum. The lower boundary is gradual and slopes toward the arroyo.

Stratum 2 is a brown (10YR 5/3 to 4/3) silt loam. The structure is blocky with small peds. Roots, charcoal, and ash are present in the stratum. This stratum is developed in alluvial and residual deposits. Excavation was stopped after removing 12 cm to 16 cm of the stratum. The lower boundary is unknown.

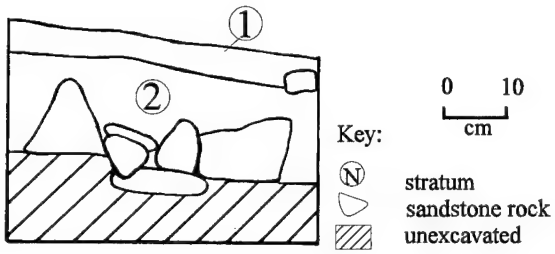

Figure 7.18 North wall profile, Test Unit 4, 5LA3570.

Feature 11 Feature 11 was identified as a basin-shaped hearth eroding from the south bank of an arroyo, southeast of the midden. The feature was partially excavated to a point where it could be reasonably stabilized (Figure 7.19). The majority of the excavated fill was collected for sample analysis. Approximately 9.5 liters were screened through ⅛" mesh. The arroyo bank was cut back to a point where the feature was stable and a profile was drawn (Figure 7.20). The remainder of the feature, about one-half, was left in place. Clean sand from Lockwood Arroyo was used to cover the feature for future excavation. Three stratigraphic units were defined and are described below.

Stratum 1 is the matrix found above the feature. It is a brown to yellowish brown (10YR 5/3 to 5/4) silt loam. It is developed in alluvial deposits. A pollen and soil sample were collected from the stratum.

Stratum 2 is a brown (10YR 5/3) silt loam with charcoal and burned sandstone. The sandstone formed an abrupt lower boundary with the underlying stratum. This stratum is mixed with sediments from the matrix.

Figure 7.19 Feature 11, 5LA3570. View to the southwest.

Stratum 3 is the bottom of the feature. It is separated from Stratum 2 by a layer of intensively burned, tabular sandstone. This stratum consists of localized oxidation and thin lenses of clean sand within a charcoal enriched silt loam.

The fill was excavated from the feature and collected for analysis: pollen, macrobotanical, soil and radiocarbon. One lithic artifact was the only artifact collected from the fill. A total of 22 pieces of burned sandstone were removed from the fill. The fill below the burned sandstone consists of a very thick charcoal layer with lenses of clean, silty sand. The fill above the sandstone contains charcoal as well, but the charcoal is mixed, and no lensing was noted.

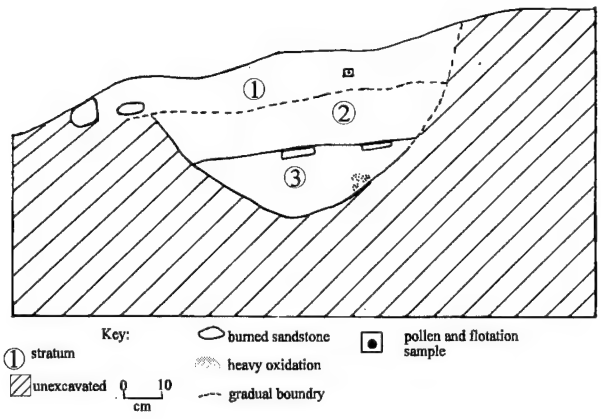

Figure 7.20 Feature 11, 5LA3570. Profile in cut bank.

A radiocarbon sample from the hearth fill produced a radiocarbon date of 2750 ± 80 BP (Beta-79751; charred material) and a calibrated date of 1065 to 795 cal B.C. (2 sigma) with an intercept radiocarbon age with calibration curve of 890 cal B.C. (Appendix I). This places the construction and use of the hearth during the Late Archaic Period. Although no macrobotanical specimens were identified that would determine the function of the feature, the intense oxidation and heavy charcoal indicate that the feature was used for cooking or roasting activities. A pollen sample was collected from the fill and one from the sediment matrix. The results of pollen analysis did not show any recognizable economic resources. Questions remain about the function of the sandstone slabs found above the heavy charcoal and sand lenses. The sandstone was heavily burned indicating that the sandstone was placed in the feature during the firing process. It is not clear whether the two strata indicate separate uses of the feature, or if the layer of sandstone served a specific function in the feature.

Geoarchaeological Interpretation

Along the east edge of the site and adjacent to Lockwood Arroyo, a thick section of terrace alluvium was exposed in a cut bank. This exposure presented the opportunity to examine a section of canyon bottom alluvium for more detailed geoarchaeological analysis. The cut bank measured about 3 m in depth from the surface. A section of the cut bank was cleaned and a stratigraphic profile was drawn of the various strata (Figure 7.21). Charcoal was noted eroding from a lens near the top of the profile. Samples were collected for soil, flotation, pollen and radiocarbon analysis. Five strata were defined in the profile, and these are described below.

Stratum 1 is a brown (10YR 5/3) fine, silt loam. The structure is blocky to columnar. Inclusions consist of charcoal flecking, burned and unburned angular sandstone, small gravel, and roots. Bioturbation is heavy in the stratum. Stratum thickness varies between 1.03 m and 1.36 m. Calcium carbonate streaks present in the bottom 20 - 30 cm of the stratum had a good reaction with hydrochloric acid. This stratum is developed in overbank deposits from Lockwood Arroyo. The lower boundary is abrupt.

Stratum 2 is a brown (10YR 5/3) fine, silt loam. The structure is subangular to angular blocky. Charcoal lensing occurs in the stratum. Small sandstone gravel, roots, burned sandstone, and ash are present in the stratum. This stratum is thin and varies in thickness from 2 cm to 7 cm. It is developed in alluvium from Lockwood Arroyo. The lower boundary is abrupt, and it may indicate a prehistoric surface. Although artifacts were not noted in the stratum, the presence of charcoal and burned sandstone suggests that this stratum may represent a cultural horizon. A carbon sample taken from the stratum produced an AMS radiocarbon date of 1350±60 BP (Beta-78659; charred material). The calibrated date of the sample is cal A.D. 615-790 (2 sigma) with an intercept radiocarbon age with calibration curve of cal A.D. 670 (Appendix I).

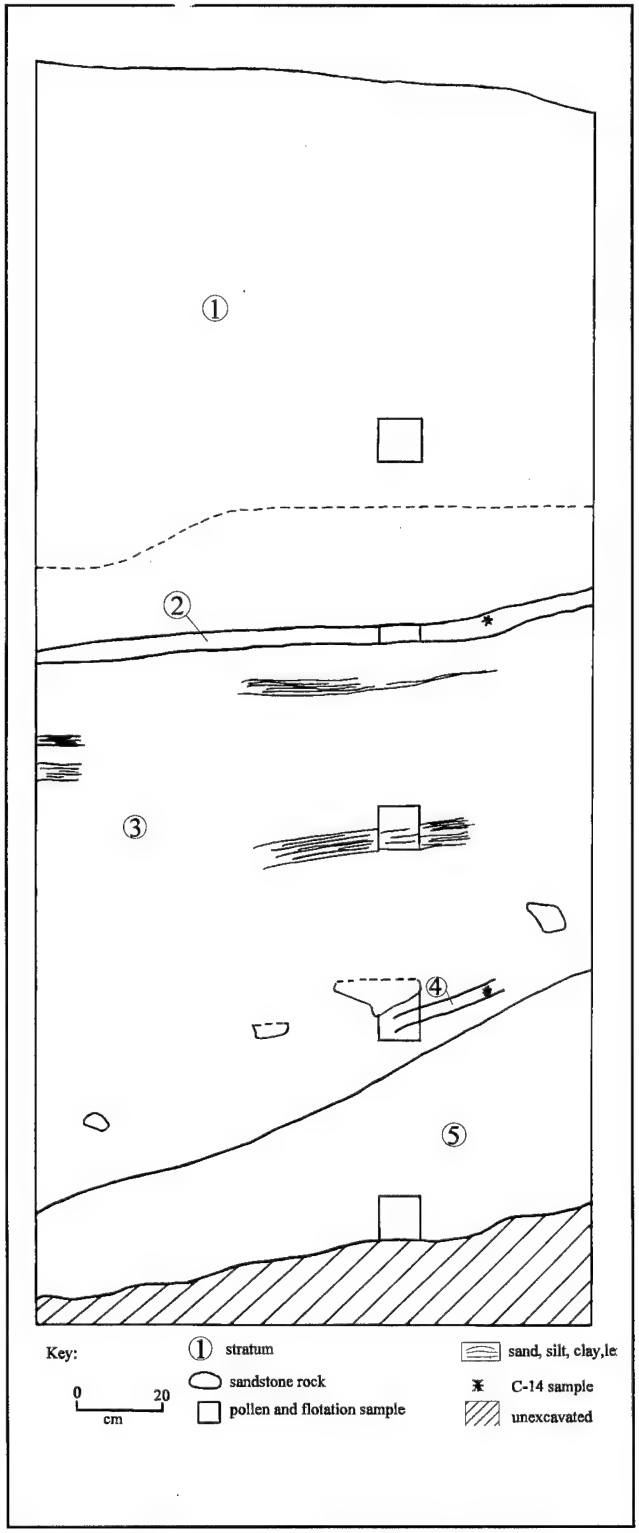

Figure 7.21 Arroyo cut bank profile, 5LA3570.

Stratum 3 is a brown (10YR 5/3) fine, silt loam. The structure is subangular to angular blocky. Roots, small gravel, charcoal flecking, and a small amount of oxidation are present in the stratum. This stratigraphic unit varies in thickness between .81 m and 1.28 m. It is developed in alluvial deposits. The lower boundary is gradual to sharp.

Stratum 4 is a thin (3 cm) lens of charcoal and burned sandstone within a brown (10YR 5/3) silt loam. The structure is subangular to angular blocky. This stratum occurs near the base of Stratum 3. Other inclusions consist of calcium carbonate streaks and roots. This stratum is most visible for about 25 cm but becomes diffuse on either side. The burned sandstone; however, continues on both sides of the lens. The lower boundary is gradual to sharp. The burned sandstone and charcoal indicate a possible cultural origin for the stratum. A radiocarbon sample obtained from this stratum produced an AMS radiocarbon date of 1510 ± 50 BP (Beta-78658; charred material). The calibrated date of the sample is cal A.D. 435 to 650 (2 sigma) with an intercept radiocarbon age with calibration curve of cal A.D. 575 (Appendix I).

Stratum 5 is a yellow-brown (10YR 5/3) silt loam. The structure is blocky to columnar. The thickness and topography of the lower boundary are unknown because the stratum extends into the bottom of Lockwood Arroyo. Caliche and roots are present in the stratum that has developed in these deep alluvial sediments.

Site 5LA3570 is situated on an alluvial floodplain along a meander loop of Lockwood Arroyo. One prehistoric occupation is identified from the surface, while three are buried beneath alluvium. A prehistoric hearth was exposed just below the surface in a the wall of a gully. This feature dates to 2750±80 BP, and this hearth represents the oldest dated component at the site thus far. Along the eastern edge of the site adjacent to Lockwood Arroyo a large cut bank profile has exposed over three meters of alluvium, overbank deposits from Lockwood Arroyo. This depositional sequence of silts and sands is interrupted by at least two apparent periods of human occupation. These occupational horizons were identified in the cut bank by lenses of fire-cracked rock, ash, and charcoal (no artifacts were recovered from the cut bank profile). The two occupational horizons are separated by 70 cm to 100 cm of alluvium that was deposited during a 200 year period between 1350±60 BP and 1510±50 BP.

Rapid sediment accumulation increases the potential for site preservation by blanketing the site with layers of alluvial; however, in a sinuous alluvial environment such as that of Lockwood Arroyo sediment accumulations at one position may be accompanied by extensive erosion at another position within the system. The site is located on a remnant of floodplain alluvium that may be the remains of a small alluvial terrace. Older cultural deposits are present at the inner edge of the site, and near the sandstone outcrop. The older deposit was not, however, identified in the cut bank profile. It is unlikely that this prehistoric deposit would have sloped to such a grade that it would be buried beneath the bottom of the exposed cut bank. It is more likely the deposit either never extended across the entire landform or it has since

eroded from this portion of the site. The potential is excellent at this site to contribute important information about the geoarchaeology of the site in particular and of similar sites within the PCMS. Results from this testing phase, although minimal in scope, have added important information about the geoarchaeology at the site, and this research avenue should be a primary focus for future investigations. It is especially important because this site is experiencing accelerated erosion that is compromising the site's archaeological context. The edges of the site are subject to rapid gully erosion that is transporting sediments and archaeological materials downslope to the arroyo channel. The gully erosion is a product of the lack of well-established vegetation and the channeling of slopewash across the site and into the gullies.

ANALYSIS AND INTERPRETATION

One hundred and twenty-one artifacts were examined from site 5LA3570. Fifty-eight artifacts were observed on the surface (Table 7.1). One hammerstone, one quartzite core, one chalcedony biface, one quartzite projectile point, three retouched flakes, one utilized flake, seven metate fragments, and forty-three pieces of lithic debitage were noted within the surface assemblage. The chalcedony biface may be a broken projectile point. The quartzite projectile point (Figure 7.22) is corner-notched and is most similar to a Category 41 Type (Lintz and Anderson 1989:160). This point type tentatively dates from A.D.600 to A.D.1200. These projectile points are described as:

> *sharp tips, ovate blades with convex edges, barbed shoulders, a short but broad expanding stem, rounded to pointed tangs, and straight to convex bases. The haft elements are unground, blades are both unserrated (37 %) and slightly serrated (63 %), and the points are both biconvex (63 %) and plano-convex (37 %) in cross section.*
>
> Lintz and Anderson 1989: 160.

Flake debitage accounts for the majority (74 %) of surface artifacts. Attributes of all nontool-lithic debitage were examined in the field and in the laboratory using the methods outlined in Sullivan and Rosen (1985). Subsurface artifacts were also subjected to the standardized recording and analysis methods outlined in the PCMS manual (Dean 1992). Sixty-three artifacts were

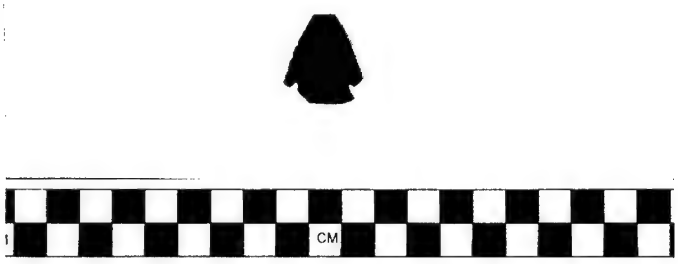

Figure 7.22 Projectile point collected from the surface, 5LA3570.

recovered from the excavations at the site. These include two metate fragments, one retouched flake, and sixty pieces of lithic debitage.

A total of 103 pieces of nontool- lithic debitage were analyzed. Results of this analysis are presented in Table 7.7.

Table 7.7 Nontool lithic debitage, 5LA3570, PCMS

Complete		Broken		Fragment		Debris		Total		
N	%	N	%	N	%	N	%	N	%	
6	14	9	20.9	8	18.6	20	46.5	43	100	Surface
3	5	5	8.3	27	45	25	47.7	60	100	Subsurface
9	8.7	14	13.6	35	34	45	43.7	103	100	Total

Based on the results of analysis, several conclusions can be drawn about the lithic assemblage. Both tool manufacturing and core reduction technologies were practiced at the site. The fact that flake fragments and broken flakes comprise over 40 percent of the total nontool debitage, which can be indicative of tool manufacturing activities according to Sullivan and Rosen (1985), and the presence of seven lithic tools, suggests that tool manufacturing was conducted at the site. The low number of observed cores (1) and complete flakes (9), supports this assumption. However, the large amount (43.7 %) of lithic debris could support the notion that despite the low number of complete flakes and cores, core reduction activities were also important. Intensive core reduction could produce greater amounts of debris to the point where cores may have been totally exhausted in the attempt to acquire as much useable material as possible. The variety of lithic artifact types within the assemblage indicates that the site had multiple uses.

Eighty percent of all subsurface lithic artifacts were recovered from Test Unit 1. Test Unit 1 was screened through ⅛" wire mesh. Despite the use of the smaller screen size, only twelve artifacts were collected in the field. The control sample (0.5 m x 0.5 m) was processed as a flotation sample. This sample produced 37 lithic artifacts, of which nine would have been missed using ⅛" wire mesh. If ¼" wire mesh would have been used to screen Test Unit 1, only 6 of 49 artifacts would have been recovered. These results demonstrate that control samples can have definite merit.

Raw material types (Ahler 1992) for the total lithic assemblage (111) were quantified as follows: quartzite (58 - 52.3 %); chert (24 - 21.6 %); argillite (13 - 11.7 %); chalcedony (10 - 9.0 %); silicified wood (2 - 1.8 %); hornfels (2 - 1.8 %); basalt (1 - 0.9 %); and obsidian (1 - 0.9 %).

Except for argillite and obsidian, the material types are locally available in the Purgatoire River. Although stream gravel are not apparent within Lockwood Arroyo in the immediate site area, it is possible that the arroyo may contain exposed gravel closer to the confluence with the Purgatoire River, roughly 7.5 miles (12 km) from the site. These locally obtainable raw materials make up nearly 90 percent of the total assemblage. Argillite is also a relatively local raw material type, but its source location is near the east end of the Hogback - basaltic dike. The Hogback is located along the southern border of the PCMS, a distance of 13.5 miles (21 km) from the site. One obsidian flake was recovered during the excavation of Test Unit 1. This flake (Obsidian Sample #1) was submitted for hydration dating and possible sourcing (Appendix III). A hydration date of A.D. 1281 +/- 49 was obtained from the sample. It was sourced to Polvadera Peak in the Jemez Mountains of north central New Mexico. The obsidian indicates that the inhabitants were transporting this material into the area through either physical procurement-traveling to the source area, scavenging other sites-or through trade.

When the site was initially recorded in 1984 by the University of Denver, two slab metates and three mano fragments were collected. Three metate fragments, also identified at that time, were not collected. Two of the three metate fragments were relocated during eligibility testing. The metates are manufactured from the local sandstone. Two of the previously collected manos identified by the original surveyors were described as being made from quartzite, while a third mano was described as being manufactured from granite. This mano was reexamined at the Fort Lewis laboratory, and the composition of this mano is sandstone conglomerate rather than granite. Seven metate fragments were noted on the surface during the testing phase. The groundstone artifacts observed during eligibility testing are manufactured from the local sandstone. The number of groundstone artifacts present at the site is an indication that plant processing was an important activity at this site.

Shell and bone were recovered in Test Unit 1. The shell was not burned and too fragmentary to identify. Most likely, the shell is from a local species of fresh water bivalve. A total of 650 pieces of animal bone were collected from Test Unit 1. Three pieces of bone were collected in the field and the rest were recovered from the control sample, which was processed as a flotation sample. A total of 456 pieces of animal bone from the flotation samples in Test Unit 4 were also examined. Although the total amount (1106) of bone was high, nearly all the bone was obtained from the flotation samples and is extremely small, making identification very difficult. Thirteen percent (146) of the bones were burned. Table 7.8 shows the amount of burned and unburned bone from by level. One bone in Test Unit 4 Layer 1, Level 1, and one bone in Test Unit 1, Layer 2, Level 1, were identified as small animal mandible fragments - species unknown. One cervical vertebra fragment and one phalanx of an unidentifiable small animal were noted in Test Unit 1, Layer 1, Level 5, along with the only bone identified by family, which was the partial innominate of a Sciuridae (squirrel). Many of the bones may be attributed to rodents, with only five out of over a thousand pieces of bone even identifiable to element. The burned bone may be associated with the human occupation. Twenty percent of the bone in Test Unit 4, which was excavated in the midden (Feature 9), was burned while only seven percent of the bone in Test Unit 1 was burned.

Table 7.8 Burned and unburned bone from Test Unit 1, 5LA3570, PCMS.

Test Unit	Layer	Level	Burned		Unburned		Total
			N	%	N	%	N
Test Unit 1	1	1	6	7.9	70	92.1	76
	1	2	2	3.2	60	96.8	62
	1	3	11	6.7	152	93.3	163
	1	4	29	13.7	183	86.3	212
	1	5	3	1.8	164	98.2	167
	2	1	5	10.9	41	89.1	46
Test Unit 2	1	1	71	23.4	233	76.6	304
	1	2	25	16.4	127	83.6	152
Total			146	13.2	960	86.8	1106

Fifteen pollen samples were collected from the site; two samples were collected from Feature 11, six were collected from the arroyo profile, and an additional seven samples were collected from the other test units. Seven samples were sent for analysis (Appendix II). There is a fairly high amount of Cheno-*Am* (goosefoot, amaranth, saltbush, etc.) in five of the samples submitted. The high amount of Cheno-*Am* pollen aggregates from these samples indicates the plants grew locally. Cheno-*Am* served as an economic resource for prehistoric populations, and it is possible that the plant was utilized by inhabitants at the site; however, the presence of Cheno-*Am* aggregates from these samples suggests that these plants were present in the immediate vicinity of the site or perhaps they were being harvested and processed at the site. Pollen samples were taken from each of the five strata from the arroyo profile. Pollen preservation was excellent in all but the lowest stratum (Stratum 5). Again, Cheno-*Am* pollen is the most abundant (+60 %) pollen in four of the five strata (Appendix II). Spruce pollen, was present in four of the five strata. Stratum 5 did not produce any Spruce pollen, and the amount of Spruce pollen increases from the top to the bottom in the profile while Juniper pollen increases from the bottom to the top in this same profile. Spruce are not present at the site; furthermore, they are not local to the PCMS in general. The results of pollen analysis at the site show a gradual environmental change occurring over the last 1,500 years from slightly wetter to slightly drier environmental conditions. Pollen samples from Feature 11 were taken from the hearth fill (FS#31) and from the surrounding matrix (FS#30). Cheno-*Am* pollen aggregates and other local

pollen types were present in the hearth fill, but did not occur in the matrix. The hearth, an intrusive cultural occurrence, contains more pollen than the surrounding matrix, and the pollen aggregates of Cheno-*Am* may be interpreted two ways; Cheno-*Am* was of economic importance to the inhabitants at this site, or Cheno-*Am* grew in the immediate site vicinity and collected naturally in the feature. The second explanation implies that the feature was exposed during the pollination period of Cheno-*Am*.

Six radiocarbon samples were collected from the site, and three of these were submitted for radiocarbon dating (Appendix I). Feature 11, a hearth, contained charcoal, burned sandstone, oxidation, and one lithic artifact. A radiocarbon sample (Beta-79751) from the hearth fill produced a calibrated date of 1065 to 795 cal B.C. (2 sigma) and an intercept radiocarbon age with calibration curve of 890 cal B.C. (Beta-79751). This date places the construction and use of the hearth during the Late Archaic Period. Two radiocarbon samples from the arroyo profile were submitted for dating. One sample was collected from Stratum 2 where ash, charcoal, and burned sandstone were observed. This stratum possibly represents a buried cultural horizon. This radiocarbon sample from Stratum 2 produced a calibrated date of A.D. 615 to A.D. 790 with a calibrated intercept date of A.D. 670 (Beta-78659). A second sample was collected from Stratum 4 that is approximately 0.75 m lower in the profile than Stratum 2. A lens of charcoal and burned sandstone was observed in Stratum 4, and this stratum may also represent a cultural horizon. The radiocarbon sample produced a calibrated date of cal A.D. 435 to 650 (2 sigma) with a intercept radiocarbon age with calibration curve of A.D. 575 (Beta-78658). Both radiocarbon dates from the arroyo profile are included within the Early Ceramic Period, and are separated by 100 years. During this 100 year span, approximately .75 m of alluvium was deposited on the terrace. This is not unusual considering the rapid depositional characteristics of Lockwood Arroyo.

The interpretation of field and laboratory analysis from 5LA3570 demonstrates that the site is multi-component, and that occupation of the site occurred during the Late Archaic to Middle Ceramic Periods. Structure A1 does not appear to represent a permanent shelter, although it may have served as a temporary shelter. The numerous burned rock features and the possible game drive (Feature 10) have not been dated, and their temporal and cultural association with other features at the site is open to speculation.

CONCLUSIONS

5LA3570 is a limited habitation and campsite with multiple temporal components. The site is located on an alluvial terrace at the confluence of an unnamed arroyo and Lockwood Arroyo. Site evaluation for the NHRP was conducted by Fort Lewis College on August 28-30 and September 7, 1994. Surface artifacts were mapped and analyzed in the field. Four test units were excavated at the site. In addition to the features originally identified by Denver University, five newly identified features were mapped and described by Fort Lewis College. The newly-recorded features include a concentration of burned sandstone, a concentration of 12 unburned large, sandstone rocks, a midden deposit, and a possible game drive line. A later site

inspection on July 13,1995 by Steve Chomko revealed additional supportive evidence for this interpretation. At the base of the cliff below and between the east ends of the two drive line is a remnant alluvial terrace. The terrace surface, which is located 3.0 m to 3.5 m above the base of the channel of Lockwood Arroyo, extends a distance of 2.0 m east of the cliff. Examination of an exposed portion of the terrace cut bank revealed a buried A soil horizon .75 m below the terrace surface and a shallow, basin-shaped feature containing fire-cracked rock immediately below the bottom of the soil. At the base of the terrace cut bank below the feature were three fragments of unidentifiable large mammal long bone.

Pollen and radiocarbon samples were collected from archaeological features and from possible cultural strata within the alluvium. The results of field and laboratory analysis have demonstrated that 5LA3570 is eligible for nomination to the NHRP under Criterion D; the potential to yield significant information about the prehistoric lifeways of the inhabitants of the PCMS. Furthermore, the potential to evaluate the paleoenvironment of the PCMS and its relationship to the archaeological resources is provided at this site. While this site is not unique in its setting, it holds the potential to increase the knowledge of the geoarchaeology of the PCMS through the analysis, interpretation, and correlation of the stratigraphy at this site to similar locations within the PCMS (Schuldenrein et al 1985, McFaul and Reider 1990a).

CHAPTER 8

5LA4603

INTRODUCTION AND LOCATIONAL INFORMATION

Site evaluation for the NRHP was conducted at 5LA4603 by Fort Lewis College from August 24 through 27, 1994. A total of 9.5 person days were spent at the site. Work at the site consisted of EDM mapping, surface artifact identification and analysis, twenty-four shovel test excavations, and three test unit excavations. The results of field work and laboratory analysis were used to determine that the site does not meet the criteria for eligibility for nomination to the NRHP. No further archaeological work is recommended at the site.

Site 5LA4603 is a small (5,181 m^2) open lithic scatter located near the southwestern edge of a broad southeasterly trending steppe (Figure 8.1) that separates Iron Canyon to the west and an unnamed canyon to the east. Minnie Canyon lies 2 km (1.3 mi) northeast of the unnamed canyon. These canyons form tributaries to the Purgatoire River, which is located 3.75 km (2.3 mi) to the southeast of the site. The site is situated above the canyon rim overlooking a small tributary of Iron Canyon. This intermittent drainage is the closest water source. The immediate site area is relatively flat; however, the terrain begins to slope downward into the canyon once the canyon rim is crossed. The site is at the transition between the Steppes and the Canyon/Arroyo Landscape Units (Figure 1.2). The canyon rim forms an observable boundary between the open grasslands and the wooded canyon areas. A northwest to southeast trending powerline is located 150 meters north of the site. Legal descriptions and other pertinent locational information for 5LA4603 are listed in Table 1.1. Figure 8.2 is a map of the site depicting topographic details, site boundaries, feature locations, and subsurface excavations.

SITE SETTING

Geology

The bedrock geology at the site is representative of the Lower Cretaceous Dakota Sandstone Formation. It outcrops near the site and rises to the surface near the canyon rim. The Formation is described in more detail in Chapter 2.

Soils

Soils at the site are described as Travessila-Wiley-Villagreen (U.S.S.C.S 1983). The stratigraphic profile of the excavation units show two strata; a brown silty sand that varies in thickness from 7-22 cm overlying a yellow-brown to red-brown silt loam.

Figure 8.1 General site overview, 5LA4603. View to the southwest

Variation in strata thickness is a result of the location within the site. Higher and more stable areas exhibit greater deposition than lower and more eroded areas. Deposition is thinner at lower elevations and in deflated areas. The site has been affected by light to moderate erosion, mostly attributable to wind and water.

Vegetation

Vegetation is consistent with a prairie grassland community. Identified plants include sixweeks fescue, foxtail barley, crested wheatgrass, snakeweed, and cholla. Two small junipers were also noted within the site boundaries. The nearby canyon rim and slope exhibit a significant increase in the number of junipers.

PREVIOUS SURVEY RESULTS

5LA4603 was originally recorded in June of 1987 by personnel from Larson-Tibesar Associates (Colorado State Site Form, 5LA4603). The site was located during an archeological inventory of random blocks within designated environmental zones. The archaeologists considered the site potentially eligible for nomination to the NRHP based on the following criteria: (1) high probability for subsurface cultural remains indicating depositional integrity; (2) the site provided the opportunity to examine an open lithic site along the

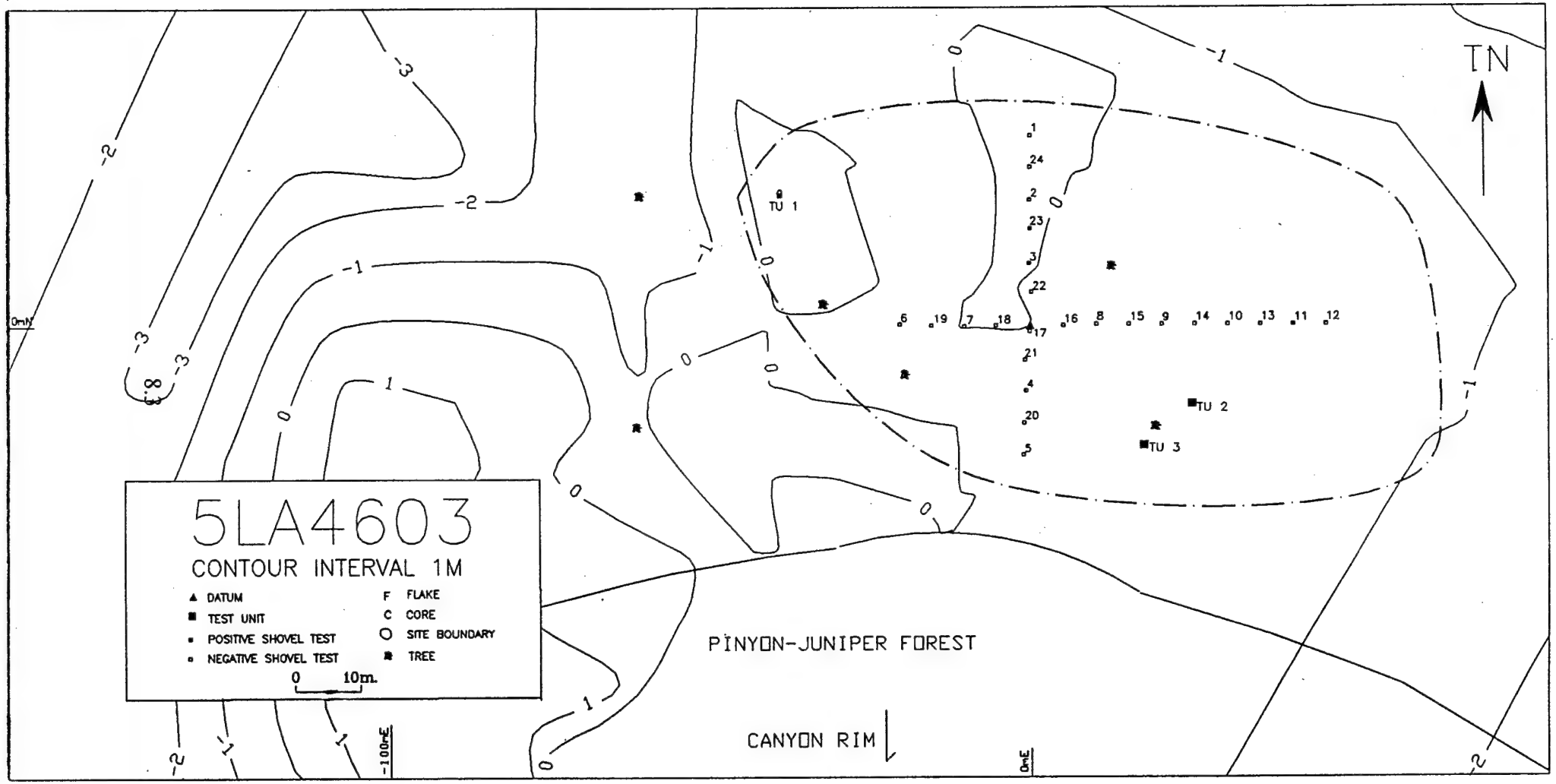

Figure 8.2 General site map, 5LA4603.

prairie/woodland transition, and; (3) data from the first two criteria could be used in a predictive model for similar sites. Three pieces of lithic debitage (two pieces of argillite and one piece of quartzite) were collected from the site surface. No diagnostic artifacts were recovered ; therefore, temporal affiliation was not discussed. Aside from laboratory analysis, survey reporting, and site flagging, the site received no further archaeological work until the eligibility testing conducted by Fort Lewis College.

RESULTS OF ELIGIBILITY TESTING

Surface Reconnaissance

A cursory surface assessment of the site succeeded in locating the original PVC datum; however, the PVC was no longer in the ground and a new datum (rebar) was positioned near where the PVC was lying. This was as close to its original position as could be determined from existing maps and photographs. North-south (x) and east-west (y) base lines were laid in from the new datum. The north-south baseline was oriented to true north (11° easterly declination). Pedestrian transects were surveyed across the site using the established base lines for orientation. Transects extended a short distance past the flagging line. All surface artifacts were pinflagged, field analyzed, and mapped with the EDM.

The original site recorders reported roughly two dozen flakes (primarily basalt, quartzite, and chert) from the surface. Twenty-four pieces of lithic debitage, two retouched flakes, and one lithic core were mapped (Figure 8.3) on the surface during the 1994 field season (Table 8.1). This suggests that little has changed since the site was originally recorded. Surface artifacts were concentrated in areas of obvious erosion. One small erosional wash exposed a number of artifacts. In addition to the surface artifacts, a possible feature consisting of two small upright pieces of sandstone was recorded and mapped.

Subsurface Investigations

Twenty-four shovel tests and three test units were excavated at 5LA4603. The locations of these tests are shown in Figures 8.2 and 8.3.

Shovel Tests Subsurface investigations began by placing lines of shovel tests spaced five meters apart along the x - y base lines. The shovel tests were placed in areas where surface artifacts were visible, as well as in areas that appeared to have the potential for greater sediment depth. Shovel tests were excavated until gravel or sediment compaction precluded further excavations. A total of 24 shovel tests were excavated at the site. Three shovel tests produced four lithic artifacts (Table 8.2). All artifacts were recovered from the first 10-20 cm below surface. Artifacts appeared to occur either in the Soil "A" horizon or at the interface between this horizon and the underlying sediments.

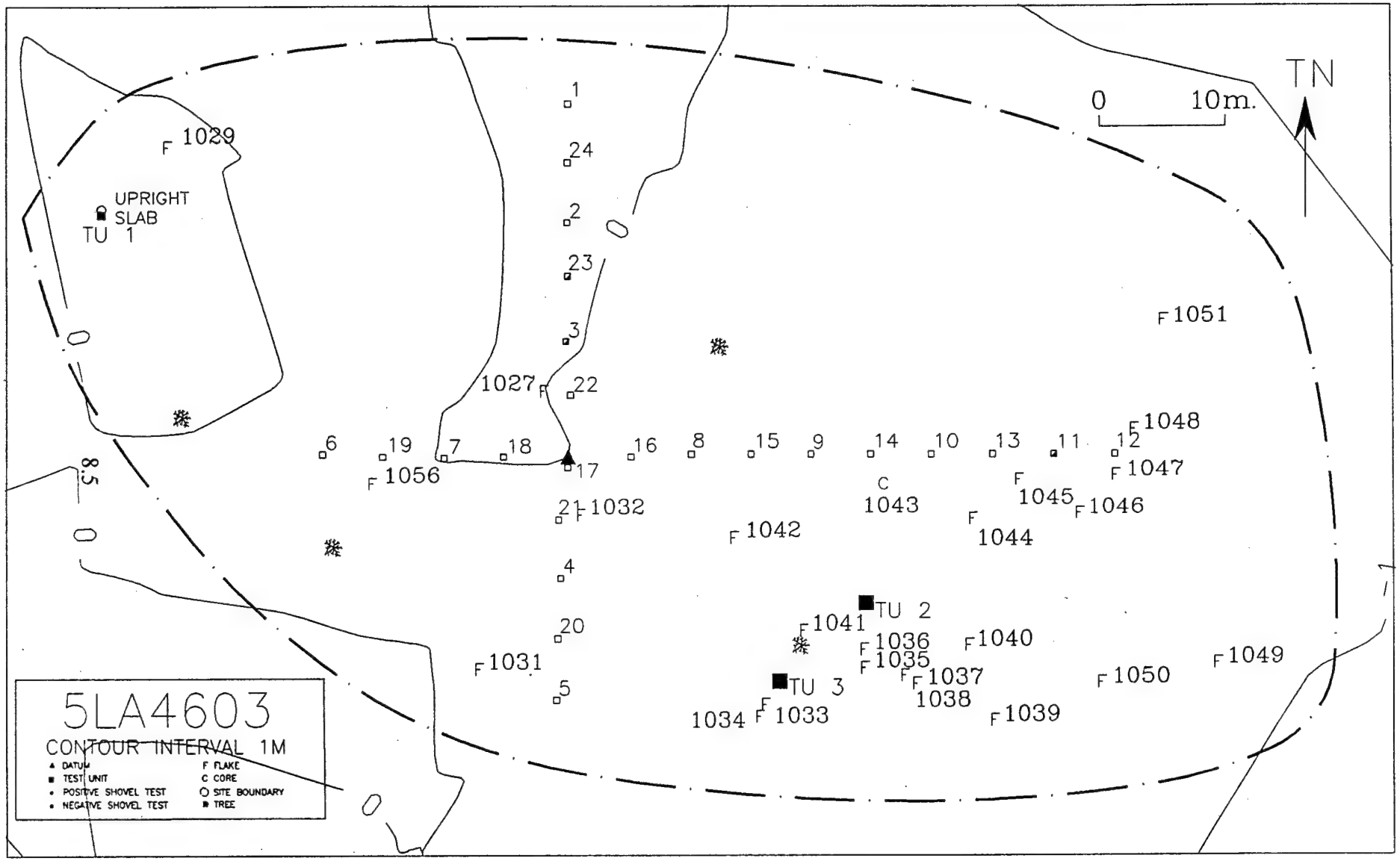

Figure 8.3 General site map with surface artifacts, 5LA4603.

Table 8.1 Surface artifacts, 5LA4603, PCMS.

Map No.	Artifact Type	Debitage Category	Material Type
26	Debris	Debris	Quartzite
27	Flake	Fragment	Basalt
28	Flake	Fragment	Quartzite
29	Flake	Broken	Quartzite
30	Debris	Debris	Chert
31	Debris	Debris	Basalt
32	Flake	Broken	Quartzite
33	Flake	Broken	Chert
34	Flake	Fragment	Basalt
35	Flake	Broken	Quartzite
36	Flake	Fragment	Quartzite
37	Flake	Broken	Quartzite
38	Retouched Flake	NA	Argillite
39	Flake	Complete	Basalt
40	Flake	Fragment	Quartzite
41	Retouched Flake	NA	Quartzite
42	Flake	Fragment	Argillite
43	Core	NA	Quartzite
44	Flake	Complete	Quartzite
45	Flake	Complete	Chert
46	Debris	Debris	Argillite
47	Debris	Debris	Argillite
48	Flake	Fragment	Chert
49	Debris	Debris	Quartzite
50	Flake	Broken	Quartzite
51	Flake	Fragment	Argillite
52	Flake	Fragment	Basalt

Table 8.2 Shovel Test Results, 5LA4603, PCMS.

No.	Depth of Stratum (cm)	General Stratigraphic Description	Materials Recovered
1	18 cm 47 cm	Brown silty sand Light red brown silt loam more compact with caliche throughout stratum	No artifacts
2	7 cm 19 cm 32 cm 43 cm	Dark brown loose silty sand brown sandy loam brown and gray silt loam light red brown compacted silt loam with caliche	No artifacts
3	20 cm 33 cm	Brown silty sand light red brown silt loam, increased compaction and caliche with depth, become more powdery	1 lithic artifact, 0 - 25 cm bgs
4	19 cm 28 cm	Brown fine, silty sand tan to off white caliche in a silty loam	No artifacts
5	22 cm 42 cm	Brown, silty sand with caliche tan to off white caliche in a silty loam	No artifacts
6	20 cm 29 cm	Brown silty sand with caliche	No artifacts
7	18 cm 31 cm	Brown silty sand tan silt loam with caliche increasing with depth	No artifacts
8	15 cm 32 cm	Brown silty sand light red brown silt loam, more compacted and caliche increases with depth	No artifacts
9	17 cm 41 cm	Same as Shovel Test 8	No artifacts
10	11 cm 46 cm	Same as Shovel Test 8	No artifacts
11	8 cm 25 cm	Brown silty sand red brown silt loam to silty clay loam with a blocky structure, compaction increases with depth	2 lithic artifacts, 0 - 10 cm bgs

No.	Depth of Stratum (cm)	General Stratigraphic Description	Materials Recovered
12	13 cm 32 cm	Brown silty sand yellow brown silt loam with more compaction with depth and occasional caliche	No artifacts
13	11 cm 31 cm	Brown silty sand light red to yellow brown silt loam with more compaction with increased depth	No artifacts
14	18 cm 30 cm	Brown silty sand yellow brown silt loam with light caliche mottling, more compaction with increased depth	No artifacts
15	16 cm 37 cm	Brown silty sand yellow brown silt loam, more compaction	No artifacts
16	15 cm 31 cm	Brown silty sand yellow brown silt loam	No artifacts
17	15 cm 29 cm	Brown silty sand tan to off white caliche in a silt loam, more compaction with depth	No artifacts
18	14 cm 30 cm	Same as Shovel Test 17	No artifacts
19	18 cm 31 cm	Brown silty sand with gravel tan to off white caliche in a silt loam	No artifacts
20	12 cm 34 cm	Same as Shovel Test 17	No artifacts
21	13 cm 33 cm	Same as Shovel Test 17	No artifacts
22	13 cm 34 cm	Same as Shovel Test 17	No artifacts
23	16 cm 49 cm	Brown silty sand light red brown silt loam, more compaction with depth	1 lithic artifact, 0 - 10 cm bgs
24	15 cm 38 cm	Same as Shovel Test 17	No artifacts

Test Unit Excavations. Three 1 m x 1 m test units were excavated at 5LA4603 (Table 8.3). Test Unit 1 was placed over the two pieces of upright sandstone to determine if they represented a buried feature. Test Units 2 and 3 were placed near deflated areas where the majority of surface artifacts were exposed. Both units were located in areas least affected by erosion and where the potential for intact buried deposits seemed greatest. Test unit excavations were conducted in arbitrary 10 cm levels within identified strata.

Table 8.3 Test unit results, 5LA4603, PCMS.

Test Unit	Size (m)	Layers	Levels	Final Depth (bs)
1	1 X 1	1	2	10 - 17 cm
2	1 X 1	2	3	29- 30 cm
3	1 X 1	1	2	18 - 21 cm

Test Unit 1. Test Unit 1 was excavated to determine if two upright pieces of sandstone were the remains of a cultural feature. The unit was placed over one of the uprights. Excavation indicated that the uprights were broken bedrock. Four other pieces of sandstone were exposed during test unit excavation and appear to be part of the same tabular piece of sandstone. No evidence of other uprights or alignments was discerned. One 10 cm level and one partial 10 cm level were excavated. Small sandstone and caliche gravel were encountered throughout both levels. Excavation was discontinued when decomposing bedrock was encountered. The water screen sample from Level 1 yielded one small flake, which was the only artifact collected from the unit (Table 8.4). A water screen sample was not taken from the partial level (Level 2), because it contained more gravel than sediments.

Table 8.4 Results of Test Unit 1, 5LA4603, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	7 - 13 cm	1 lithic artifact
1	2	11 - 17 cm	No artifacts

Stratigraphy. The south and east walls of Test Unit 1 were cleaned, photographed and profiled. Figure 8.4 is an illustration of the stratigraphy from the south wall. One stratigraphic unit was defined and is described below.

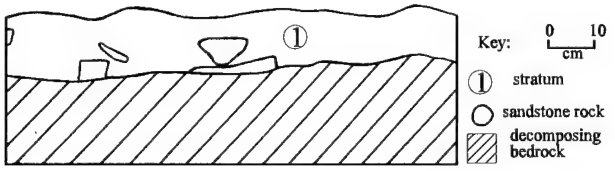

Figure 8.4 South wall profile, Test Unit 1, 5LA4603.

Stratum 1 is a brown, (10YR 5/3) silty sand. It is friable, although compaction increases with depth in the stratum. The structure is weak blocky with small pediments. Excavation was hindered by the presence of large numbers of sandstone and caliche gravel that increased with depth. Excavation was terminated when decomposing bedrock (weathered "C" horizon) was encountered. One lithic artifact was recovered from the stratum. This stratum is a thin Soil "A" horizon developed in eolian and residual deposits. The thickness varies between 10 - 17 cm.

Test Unit 2. Test Unit 2 was excavated to determine whether intact cultural deposits existed adjacent to a deflated area where a number of artifacts were exposed on the surface. Two lithic artifacts were recovered during excavation; one flake was found from 0 - 5 cm below the surface and a second flake was recovered between 13 - 17 cm below the surface. Two additional flakes were collected from the water screen sample for Layer 1, Level 1. All but one of the artifacts were in the initial 10 cm and occured in Stratum 1 (Table 8.5). Test unit excavations were terminated after a third level proved to be culturally sterile. The sediments were compacted, and caliche began to dominate the stratum. Water screen samples were taken from all three excavated levels.

Table 8.5 Results of Test Unit 2, 5LA4603, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	10 cm	3 lithic artifacts
1	2	20 cm	1 lithic artifact
2	1	29 - 30 cm	No artifacts

Stratigraphy. The north and east walls of Test Unit 2 were cleaned, photographed and profiled. The north wall profile (Figure 8.5) illustrates the two stratigraphic units that are described below.

Stratum 1 is a brown, (10YR 5/3) silty sand with a few small sandstone gravel. It is friable, but becomes more compacted with depth. The structure is weak blocky with small pediments. Roots, artifacts, and sandstone gravel are present in the stratum. This stratum is a thin Soil "A" horizon developed in eolian and residual deposits. The thickness varies between 12 - 20 cm. The lower boundary is clear.

Stratum 2 is a yellow brown (10YR 5/4) silt loam. It is friable but becomes more compacted with depth. The structure is blocky with small pediments. Small sandstone gravel and caliche particles are present. The caliche increases with depth. This stratum is a weak Soil "B" horizon developed in eolian and residual deposits. Excavations were halted after excavation of 8 - 17 cm of the stratum failed to produce any artifacts.

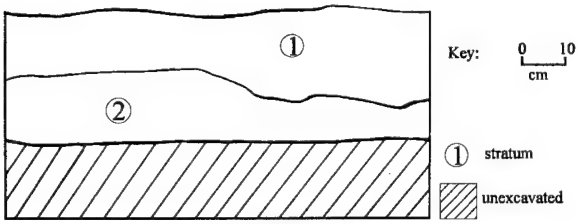

Figure 8.5 North wall profile, Test Unit 3, 5LA4603.

Test Unit 3. Test Unit 3 was excavated to determine whether intact cultural deposits existed adjacent to a deflated area that exposed a number of surface artifacts. One flake was recovered from the water screen sample from Layer 1, Level 1 (Table 8.6). The artifact was large enough to be recovered by the standard ¼" screen size as opposed to the much smaller 1/16" screen size used for waterscreen samples. The artifact was recovered from Stratum 1. The unit was terminated at the base of Level 2 due to a lack of cultural material, increasing soil compaction, and greater amounts of caliche.

Table 8.6 Results of Test Unit 3, 5LA4603, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	10 cm	1 lithic artifact
1	2	18-21 cm	No artifacts

Stratigraphy. The north and east walls of Test Unit 3 were cleaned, profiled and photographed. The stratigraphy in Test Unit 3 (Figure 8.6) is very similar to that of the other test units. Stratum 1 in Test Unit 3 is the same as Stratum 1 in Test Unit 2. The only difference between the two is that in Test Unit 3, Stratum 1 is thinner and measures 6 - 14 cm thick (Figure 8.6). One flake was recovered from Stratum 1, in Test Unit 3. Stratum 2 is identical to Stratum 2 in Test Unit 2. No artifacts were recovered from this stratum, and excavations were stopped after 5 - 13 cm had been removed from the stratum.

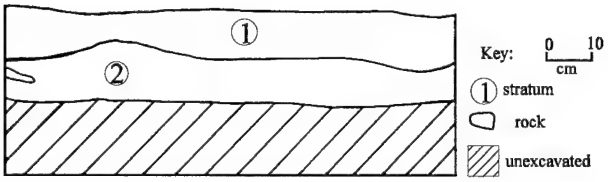

Figure 8.6 North wall profile, Test Unit 3, 5LA4603.

ANALYSIS AND INTERPRETATIONS

Twenty-seven artifacts were identified on the surface at 5LA4603. These artifacts include one quartzite core and two retouched flakes. The remainder of the artifacts (24) consisted of nontool lithic debitage (Table 8.7). Ten lithic artifacts were recovered from the subsurface excavations. The nontool lithic debitage was analyzed using the methods outlined by Sullivan and Rozen (1985). The small number of artifacts limits the inferences that can be drawn from the lithic assemblage; however, there appear to be few quantitative differences among the categories. Because the percentages of debitage categories are fairly equal, lithic activities at the site can be explained as a mixture of both core reduction and tool manufacture. The small artifact assemblage probably reflects a short-term occupation such as a temporary encampment.

Table 8.7 Nontool lithic debitage, 5LA4603, PCMS.

Complete		Broken		Fragment		Debris		Total		
N	%	N	%	N	%	N	%	N	%	
3	12.5	6	25.0	9	37.5	6	25.0	24	100	Surface
3	30.0	3	30.3	2	20.0	2	20.0	10	100	Subsurface
6	18	8	26.47	11	32.35	8	23.53	34	100	Total

The lithic artifacts were separated into raw material type categories defined by Ahler (1992) for the PCMS. Material types include quartzite (15 [40.6%]), argillite (11 [29.7%]), chert (6 [16.2%]) and basalt (5 [13.5%]). With the exception of argillite, all material types are present in the gravel deposits of the Purgatoire River located 3.75 km (2.3 mi) east of the site. The argillite, also of local origin, outcrops near the east end of the Hogback-basaltic dike, found along the southern border of the PCMS. This outcrop is about 41 km (25 mi) from the site. Basalt can be obtained from the Hogback, but is also present in the Purgatoire River gravel. Cherts and quartzites can be obtained from the river gravel as well as from tributary stream gravel (Ahler 1992).

The results of subsurface excavations did not identify a buried cultural stratum. Artifacts occur on the surface and within the first 15 cm below the surface. Four artifacts were obtained through shovel testing and six from test unit excavation. Four of the six artifacts collected from test unit excavation were recovered from the water screen samples. All but one of these artifacts would have been retained by the ¼" mesh. The sediments at the site are a result of eolian and residual processes. These deposits are fairly shallow with increasing amounts of caliche appearing in the lower depths of the excavation units. Subsurface features, structures or a defined cultural stratum were not identified through subsurface testing. The temporal affiliation of the site could not be determined due to the absence of diagnostic artifacts.

CONCLUSIONS

5LA4603 consists of a small, open lithic scatter near the southwestern edge of a broad southeasterly trending steppe. The site was mapped and surface artifacts were analyzed. Twenty-four shovel tests and three 1 m x 1 m test units were excavated. Evidence for a buried cultural stratum was not discovered. The site is not considered to be eligible for nomination to the NRHP based on the results of field and laboratory investigations. No further archaeological work is recommended at this site.

CHAPTER 9

5LA4606

INTRODUCTION AND LOCATIONAL INFORMATION

Site evaluation for the NRHP was conducted at 5LA4606 by Fort Lewis College from September 9 through September 11, 1994. A total of 11 person days were spent at the site. Work completed at the site consisted of EDM mapping, surface artifact identification and analysis, and test excavation. Twenty-nine shovel test and four 1 m x 1 m test units were excavated. The results of field work and laboratory analysis were used to determine that the site does not meet the criteria for eligibility for nomination to the NRHP. No further archaeological work is recommended at the site.

Site 5LA4606 is an open lithic scatter located at the transition between the Steppes and Arroyo/Canyon Landscape Units (Figure 1.2). The rim of Bent Canyon is located 50 m to the southwest and Iron Canyon is approximately 2.4 km (1.5 mi) to the east. Both canyons drain to the east/southeast into the Purgatoire River which is located 3.6 km (2.25 mi) from the site. Bent Canyon Arroyo, an intermittent drainage, is the nearest (0.4 km) water source. The terrain of the immediate site area is flat with a gentle slope downward near the rim of Bent Canyon (Figure 9.1). The site is located at the grassland and juniper/woodland transition. The canyon rim is the primary observable boundary between the two vegetation zones; however, there is some overlap on both sides of the rim. Legal descriptions and other pertinent information for the site are presented in Table 1.1. Figure 9.2 is a map of the site showing topographic details, site boundaries, artifact concentrations, and subsurface excavations.

Figure 9.1 General site overview, 5LA4606. View to the northwest

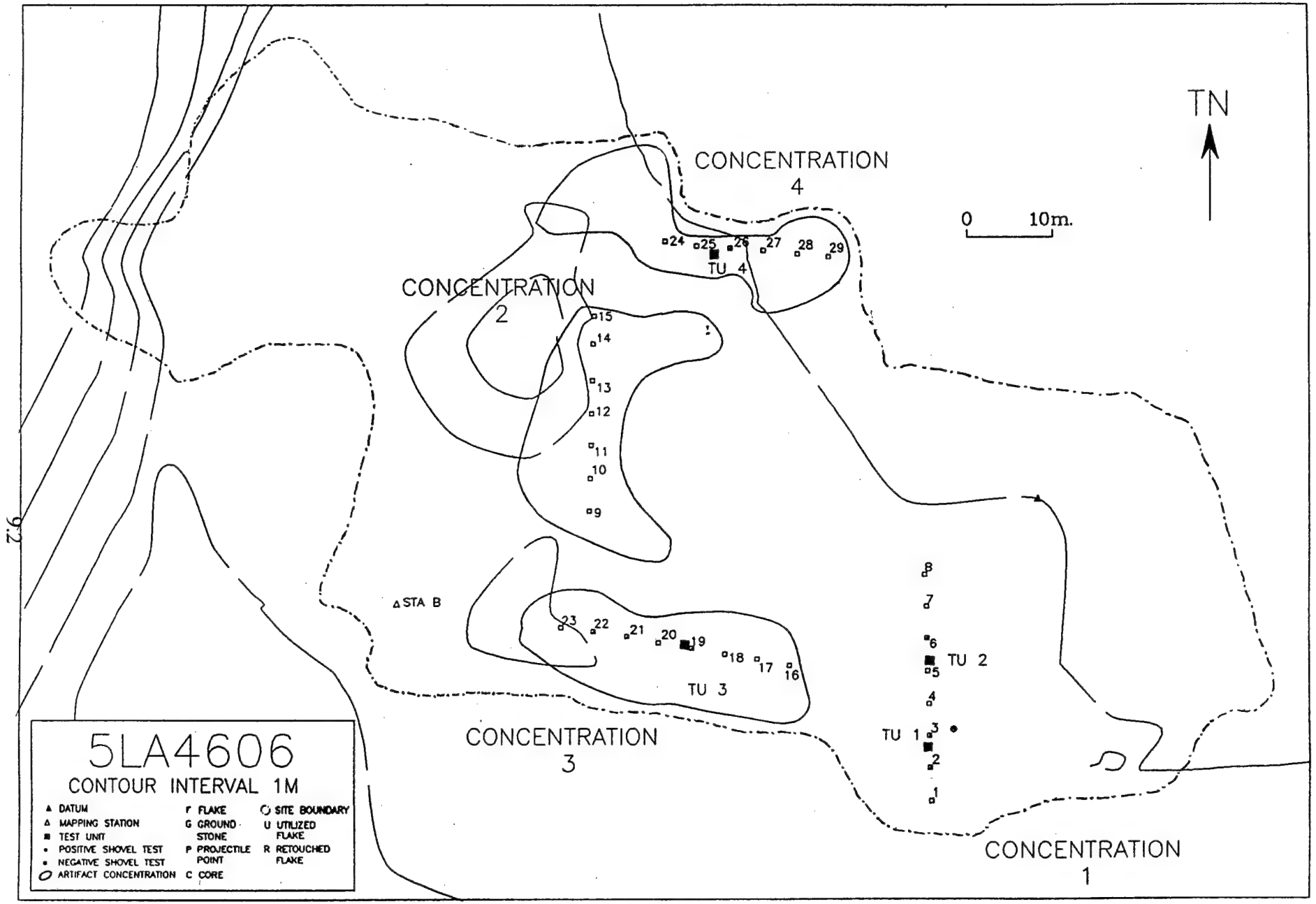

Figure 9.2 General site map, 5LA4606.

SITE SETTING

Geology

The bedrock geology at the site is representative of the Lower Cretaceous Dakota Sandstone Formation . The site is near the canyon rim; therefore, sandstone commonly outcrops on the site. Depth to bedrock varies with the topography.

Soils

Soils at the site are described as Travessilla - Wiley - Villagreen soil series (U.S.S.C.S. 1983). Soil profiles are generally consistent across the site. The profiles are composed of two primary strata; a thin, eolian (Soil "A") horizon and a subsurface sandy loam (Soil "B") that grades to a clay loam. Eolian sediments are a brown, fine-grained, silty sand. In the deflated areas, this stratum is less than 2 cm thick. The underlying stratum is a dark, yellow-brown sandy loam that grades to a compact sandy clay loam. Caliche gravel appear in the more compact sediments. The site has suffered light to moderate wind and water erosion.

Vegetation

Vegetation is consistent with a prairie grassland community. Identified plants include gallenta grass, sixweeks fescue, and cholla. Although several small juniper trees dot the site, it is essentially in the open grassland.

PREVIOUS SURVEY RESULTS

5LA4606 was originally inventoried in June of 1987 by personnel from Larson-Tibesar Associates (Colorado State Site Form, 5LA4606). A Middle Archaic projectile point base (Appendix IV) was found at the site along with a scatter of lithic artifacts. Seven pieces of lithic debitage, one broken argillite flake tool, one quartzite biface midsection, and a petrified wood lanceolate point base (Middle Archaic) were collected from the site. The majority of artifacts were noted eroding from deflated areas, and it was reasoned that intact buried deposits were likely to be encountered within the stable portions of the site as opposed to other sites in the area with little or no deposition. Because the site held the potential to yield information about Middle Archaic settlement and subsistence strategies in the PCMS, it was recommended that the site be considered potentially eligible for nomination to NRHP. Aside from laboratory analysis, survey reporting, and site flagging, the site received no further archaeological work until the eligibility testing conducted by Fort Lewis College.

RESULTS OF ELIGIBILITY TESTING

Surface Reconnaissance

A PVC datum was located in an area near where the original site datum was shown on the site map. The PVC datum, however, was not in place and a new rebar datum was placed as close to the original map location as possible. A U.S.G.S. Section Corner (common corner for Section 15, 16, 21, and 22; T28S, R56W) was found southwest of the site. An exploratory site inventory was followed by a systematic transect survey. All observed surface artifacts were pinflagged, mapped with an EDM (Figure 9.3), and field analyzed (Table 9.1). The majority of surface artifacts were concentrated in the deflated areas. Three artifacts were collected from the surface:

one sample of lithic material type; a groundstone fragment; and a piece of shaped tabular sandstone.

An area surrounding and including site 5LA4606 was flagged for tank avoidance. This flagged area was much larger than the previously identified site boundaries. The entire flagged area was subjected to transect survey by Fort Lewis College. This survey identified four small artifact concentrations within the site boundaries, and the site boundaries were minimally adjusted to include these concentrations.

A dense artifact scatter near the section corner was identified at the extreme southwestern edge of the flagging. This dense scatter was inventoried, mapped and recorded as a separate site. The distinction between the new site, 5LA6552, and 5LA4606, is based on the distance from the original site boundaries of 5LA4606, temporal distinctions in projectile point types between the sites, and noticeably different material types between the two sites.

Subsurface Investigations

Twenty-nine shovel tests and four test units were excavated at the site. The locations of these tests are shown in Figure 9.2 and Figure 9.3.

Shovel Tests A line of shovel tests was placed at four meter intervals in each of the four identified artifact concentrations. The shovel tests were placed in the more stable surface areas within the concentrations to determine if subsurface artifacts were present, and to identify the areal extent of the artifacts. Shovel tests were halted at bedrock or when sediments become too compacted to excavate further. Eight shovel tests were placed in Concentration 1, seven in Concentration 2, eight in Concentration 3, and six in Concentration 4 (Figure 9.2). Eight pieces of lithic debris were recovered from seven of the shovel tests; all eight artifacts were recovered from depths between 0 and 20 cm below the surface (Table 9.2). These eight artifacts were in the upper Soil "A" horizon or at the interface between the Soil "A" and Soil "B" horizons.

Test Unit Excavations Four test units were positioned at the site primarily as a result of information garnered from the shovel tests. Positive shovel tests indicated where the potential for buried cultural material was highest. Test Unit 1 and Test Unit 2 were placed in Concentration 1. Test Unit 3 was placed in Concentration 3 and Test Unit 4 in Concentration 4. No test units were placed in Concentration 2 because seven shovel tests failed to produce any buried artifacts. All the test units were placed in areas where the surface was stabilized by vegetation. The units were excavated in arbitrary 10 cm levels within stratigraphic layers (Table 9.3).

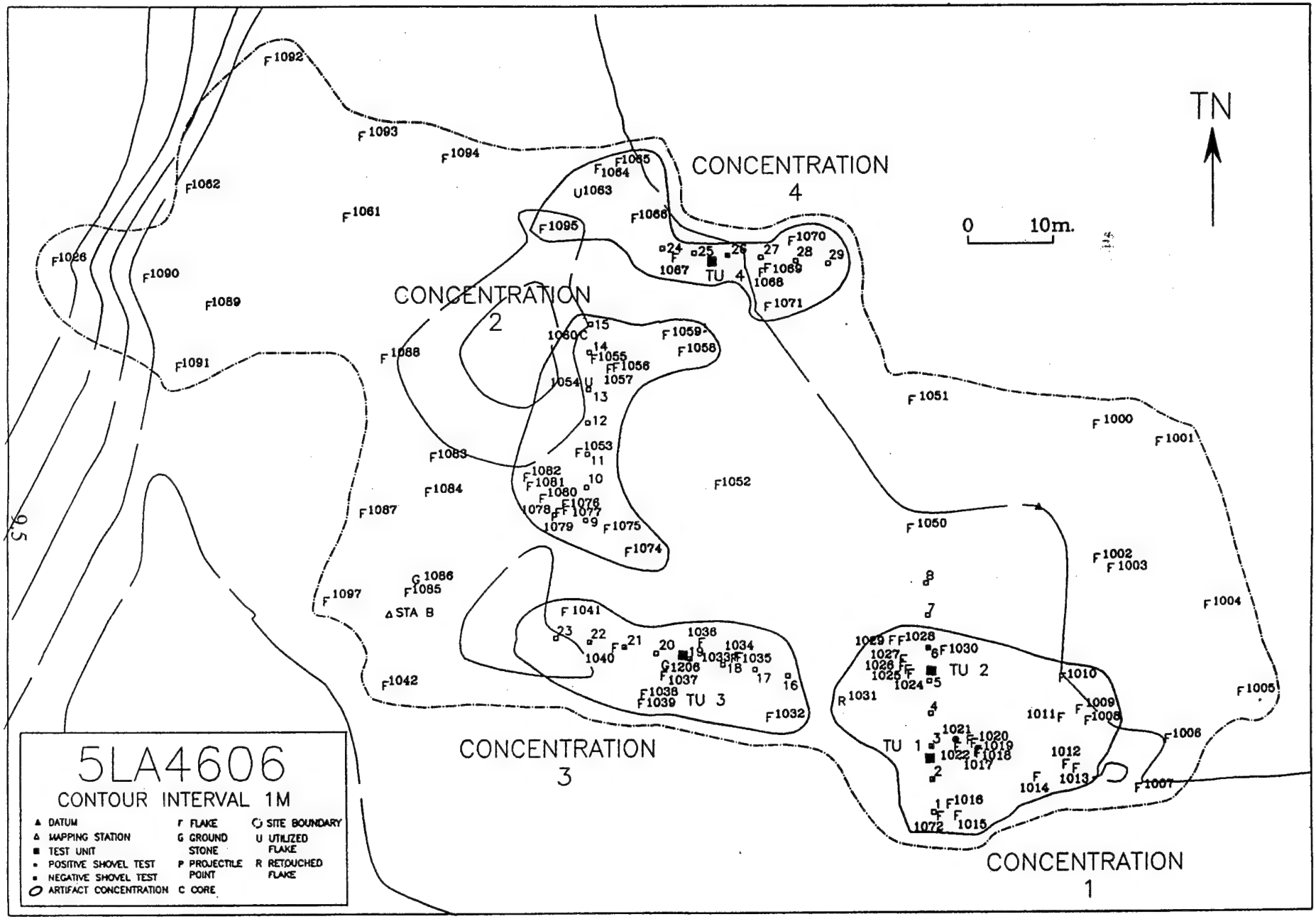

Figure 9.3 General site map with surface artifacts, 5LA4606.

Table 9.1 Surface artifacts, 5LA4606, PCMS.

Map No.	Artifact Type	Flake Type	Material Type
1000	Debris	Debris	Basalt
1001	Flake	Fragment	Basalt
1002	Flake	Fragment	Basalt
1003	Debris	Debris	Chert
1004	Flake	Broken	Chert
1005	Flake	Broken	Chert
1006	Flake	Broken	Argillite
1007	Flake	Complete	Quartzite
1008	Flake	Complete	Chert
1009	Flake	Fragment	Basalt
1010	Flake	Complete	Argillite
1011	Debris	Debris	Argillite
1012	Flake	Fragment	Chert
1013	Flake	Fragment	Basalt
1014	Debris	Debris	Chert
1015	Flake	Broken	Basalt
1016	Debris	Debris	Argillite
1017	Flake	Broken	Argillite
1018	Flake	Fragment	Agrillite
1019	Flake	Fragment	Basalt
1020	Flake	Complete	Quartzite
1021	Flake	Broken	Argillite
1022	Debris	Debris	Basalt
1023	Debris	Debris	Argillite
1024	Debris	Debris	Quartzite
1025	Debris	Debris	Chert
1026	Debris	Debris	Chalcedony
1027	Flake	Fragment	Argillite
1028	Flake	Fragment	Basalt

Map No.	Artifact Type	Flake Type	Material Type
1029	Debris	Debris	Chert
1030	Flake	Fragment	Basalt
1031	Retouched Flake	NA	Argillite
1032	Debris	Debris	Chert
1033	Debris	Debris	Argillite
1034	Debris	Debris	Argillite
1035	Debris	Debris	Chert
1036	Flake	Fragment	Agillite
1037	Debris	Debris	Chert
1038	Debris	Debris	Basalt
1039	Debris	Debris	Argillite
1040	Flake	Broken	Argillitae
1041	Flake	Broken	Argillite
1042	Flake	Broken	Argillite
1050	Flake	Fragment	Argillite
1051	Debris	Debris	Quartzite
1052	Debris	Debris	Basalt
1053	Flake	Fragment	Argillite
1054	Utilized Flake	NA	Argillite
1055	Flake	Fragment	Argillite
1056	Debris	Debris	Chert
1057	Flake	Fragment	Chalcedony
1058	Debris	Debris	Chalcedony
1059	Debris	Debris	Argillite
1060	Core	Debris	Quartzite
1061	Flake	Complete	Quartzite
1062	Flake	Broken	Basalt
1063	Utilized Flake	NA	Argillite
1064	Debris	Debris	Chert
1065	Flake	Broken	Basalt
1066	Debris	Debris	Basalt

Map No.	Artifact Type	Flake Type	Material Type
1067	Debris	Debris	Chert
1068	Flake	Complete	Basalt
1069	Debris	Debris	Quartzite
1070	Debris	Debris	Quartzite
1071	Flake	Fragment	Quartzite
1072	Flake	Complete	Chalcedony
1073	Flake	Fragment	Basalt
1074	Flake	Complete	Quartzite
1075	Flake	Fragment	Basalt
1076	Flake	Fragment	Basalt
1077	Flake	Broken	Argillite
1078	Debris	Debris	Quartzite
1079	Debris	Debris	Argillite
1080	Debris	Debris	Argillite
1081	Debris	Debris	Chalcedony
1082	Debris	Debris	Argillite
*1083	Flake	Broken	
1084	Flake	Broken	Chert
1085	Debris	Debris	Basalt
*1086	Groundstone	NA	Sandstone
1087	Flake	Complete	Basalt
1088	Flake	Complete	Argillite
1089	Flake	Broken	Quartzite
1090	Debris	Debris	Argillite
1091	Debris	Debris	Basalt
1092	Debris	Debris	Basalt
1093	Debris	Debris	Argillite
1094	Flake	Complete	Chert
1095	Flake	Fragment	Argillite
1097	Debris	Debris	Argillite
*1206	Shaped Stone	NA	Sandstone

*Collected

Table 9.2 Shovel test results, 5LA4606, PCMS.

No.	Depth of Stratum (cm)	General Stratigraphic Description	Materials Recovered
1	6 cm 22 cm	Light brown (10YR 5/3), loose silt Red brown sandy clay loam, bocky structure, small amount of caliche, compacted	No artifacts
2	14 cm 30 cm	Fine silt sand Red brown sand loam and clay with increasing compactness	1 lithic artifact, 0-10 cm bgs
3	17 cm 32 cm	Same as Shovel Test 2	1 lithic artifact, 0-20 cm bgs
4	13 cm 24 cm	Same as Shovel Test 2, but drier with more soil structure at the base	No artifacts
5	13 cm 25 cm	Same as Shovel Test 3 and 4	No artifacts
6	13 cm 26 cm	Brown, fine silt with sand Red brown sandy loam that is more compact and clayey with depth	2 lithic artifacts, 0 - 10 cm
7	9 cm 25 cm	Same as Shovel Test 6	No artifacts
8	10 cm 31 cm	Same as Shovel Test 6	No artifacts
9	11 cm 29 cm	Same as Shovel Test 6	No artifacts

No.	Depth of Stratum (cm)	General Stratigraphic Description	Materials Recovered
10	5 cm 24 cm	Light brown silt Red brown sandy loam, small amount of caliche more compact with depth, crumbly structure like Shovel Test 1	No artifacts
11	16 cm 40 cm	Fine brown silty sand Red brown sandy loam that gradually becomes more compact with depth	No artifacts
12	9 cm 33 cm	Same as Shovel Test 11	No artifacts
13	10 cm 24 cm	Same as Shovel Test 11	No artifacts
14	9 cm 33 cm	Same as Shovel Test 11	No artifacts
15	10 cm 28 cm	Same as Shovel Test 11 with small amount of caliche, more compact with depth	No artifacts
16	9 cm 23 cm 30 cm	Brown, fine silt with sand red brown sandy loam light red brown compact snd loam	No artifacts
17	13 cm 22 cm 28 cm	Same as Shovel Test 16	1 lithic artifact, 0 - 10 cm
18	12 cm 33 cm	Brown, fine silt with sand red brown sandy loam	No artifacts
19	16 cm 28 cm	Same as Shovel Test 18	1 lithic artifact, 0 - 16 cm

No.	Depth of Stratum (cm)	General Stratigraphic Description	Materials Recovered
20	10 cm 24 cm	Same as Shovel Test 18	No artifacts
21	10 cm 22 cm	Same as Shovel Test 18	1 lithic artifact, 0 - 10 cm
22	18 cm 28 cm	Same as Shovel Test 18	1 flaked lithic, 0 - 18 cm
23	13 cm 25 cm	Same as Shovel Test 18	No artifacts
24	11 cm 32 cm	Same as Shovel Test 18	No artifacts
25	10 cm 29 cm	Same as Shovel Test 18	No artifacts
26	10 cm 31 cm	Same as Shovel Test 18	1 lithic artifact, 0 - 15 cm
27	11 cm 25 cm	Same as Shovel Test 18	No artifacts
28	7 cm 33 cm	Brown silt lighter red brown silt loam	No artifacts
29	9 cm 23 cm	Brown silt with sand red brown sandy loam	No artifacts

Table 9.3 Test unit results, 5LA4606, PCMS

Test Unit	Size (m)	Layers	Levels	Final Depth (bgs)
1	1 x 1	2	3	28 - 33 cm
2	1 x 1	1	3	28 - 31 cm
3	1 x 1	2	3	29 - 31 cm
4	1 x 1	2	2	19 - 22 cm

Test Unit 1. Test Unit 1 was placed within Concentration 1 in the vicinity of a concentration of surface artifacts where two shovel tests had produced buried artifacts. Six lithic artifacts were recovered from the first two levels in Test Unit 1. Level three did not produce any artifacts (Table 9.4). The majority of the artifacts were recovered from Stratum 1 (Layer 1, Level 1). The remaining artifacts came from near the contact between the Soil "A" and Soil "B" horizon or within 10 cm of the interface. Excavation in Test Unit 1 was discontinued at the bottom of Layer 2, Level 1 when the sediments became very compacted and after the level failed to produce any artifacts.

Table 9.4 Results of Test Unit 1, 5LA4606, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	10 cm	3 lithic artifacts
2	1	20 cm	3 lithic artifacts
2	2	28 - 33 cm	No artifacts

Stratigraphy. The south and west walls of Test Unit 1 were cleaned, photographed and profiled. Three stratigraphic units were defined in the west wall (Figure 9.4), and they are described below.

Stratum 1 is a brown, (10YR 4/3) silty sand. The structure is loose and friable and weakly developed. Roots and artifacts are present in this stratum. It is a thin Soil "A" horizon developed primarily in eolian deposits. The thickness varies between 9 and 14 cm. The lower boundary is clear.

Stratum 2 is a dark, yellow-brown (10YR 4/4) sandy loam that becomes more compact with increased depth in the profile. The structure is blocky with

small pediments. Roots are present, and one artifact was recovered near the interface with Stratum 1. The stratum consists of eolian and residual sediments. Excavations were halted after 10 - 22 cm of the stratum had been excavated. The lower boundary is gradual.

Stratum 3 is a dark, yellow-brown (10YR 4/4) sandy clay loam that was encountered only in the southwest quarter of the unit. This stratum is very compacted with caliche gravel. The structure is blocky with small pediments. This stratum is primarily a result of residual deposits with some eolian sands and silt. No artifacts were recovered from this stratum.

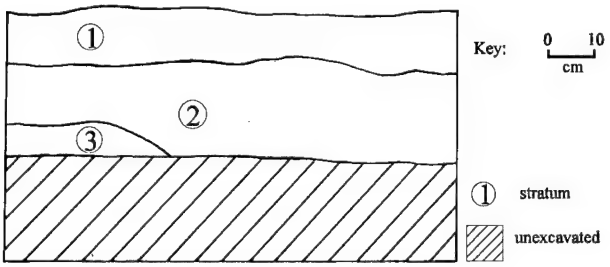

Figure 9.4 South wall profile, Test Unit 1, 5LA4606.

Test Unit 2 Test Unit 2 was excavated in Concentration 1 near an exposure of surface artifacts and adjacent to a shovel test that produced subsurface artifacts. Twelve lithic artifacts were recovered from the unit (Table 9.5). The majority of artifacts occurred in the Soil "A" horizon. The remainder occurred near the contact between the Soil "A" and Soil "B" horizons or within 10 cm of the top of the Soil "B" horizon. The unit was terminated at the base of Layer 1, Level 3 where the sediments had become very compact with rapidly increasing amounts of caliche.

Table 9.5 Results of Test Unit 2, 5LA4606, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	10 cm	7 lithic artifacts
1	2	20 cm	4 lithic artifacts
1	3	28- 31 cm	1 lithic artifact

Stratigraphy. The south and west walls of Test Unit 2 were cleaned, photographed, and profiled. Figure 9.5 is an illustration of the west wall in which three stratigraphic units were

defined. The stratigraphy of Test Unit 2 is similar to that of Test Unit 1, and the descriptions follow closely those of the previous unit.

Stratum 1 is the same stratigraphic unit as Stratum 1 in Test Unit 1. Stratum thickness varies between 3 and 13 cm. Artifacts were recovered from the stratum.

Stratum 2 is the same stratigraphic unit as Stratum 2 in Test Unit 1. Artifacts were recovered from this stratum. Bioturbation may have caused artifacts to be mixed from the overlying stratum. Stratum thickness varies between 13 and 22 cm.

Stratum 3 is the same stratigraphic unit as Stratum 3 in Test Unit 1. This stratum was only apparent in the northwest quarter of the unit. No artifacts were recovered from this stratum. The thickest exposure of Stratum 3 is 7 cm.

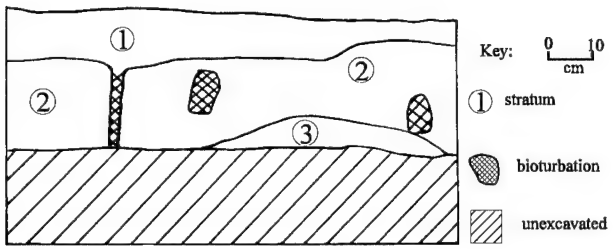

Figure 9.5 South wall profile, Test Unit 2, 5LA4606. 5LA4606.

Test Unit 3. Test Unit 3 was placed within Concentration 3 near exposed surface artifacts and in the vicinity of three shovel tests that had each produced subsurface artifacts. No cultural material was recovered from the excavations, and excavations were terminated at the bottom of Layer 2, Level 1 (Table 9.6).

Table 9.6 Results of Test Unit 3, 5LA4606, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	10 cm	No artifacts
1	2	20 cm	No artifacts
2	1	29 - 31 cm	No artifacts

Stratigraphy. The north and east walls of Test Unit 3 were cleaned and photographed, and profiles were completed. Two stratigraphic units were identified in Test Unit 3 (Figure 9.6). These strata are very similar to Stratum 1 and Stratum 2 as described for Test Unit 1, and the reader is referred to those descriptions. Buried artifacts were not recovered from any of the strata. The thickness of Stratum 1 varies between 11 - 15 cm. Excavations were halted after the removal of 14 - 20 cm of Stratum 2.

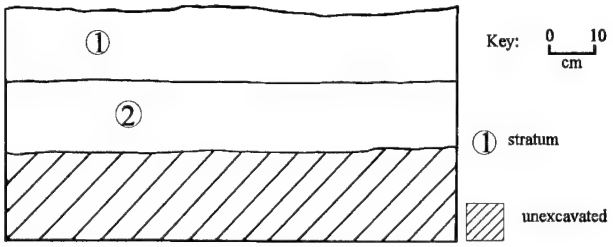

Figure 9.6 North wall profile, Test Unit 3, 5LA4606.

Test Unit 4. Test Unit 4 was placed in Concentration 4 in the vicinity of surface artifacts and one positive shovel test. One lithic artifact was recovered from the thin Soil "A" horizon (Table 9.7). The unit was terminated at the base of the second level due to the lack of cultural material and the increasing soil compaction.

Table 9.7 Results of Test Unit 4, 5LA4606, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	10 cm	1 lithic artifact
2	1	19 - 22 cm	No artifacts

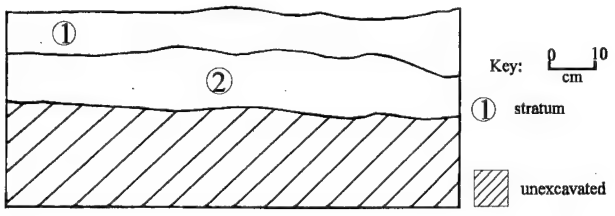

Figure 9.7 North wall profile, Test Unit 4, 5LA4606.

Stratigraphy. The north and west walls of Test Unit 4 were cleaned, photographed and profiled. Two stratigraphic units were identified in the test unit profile (Figure 9.7). These strata are very similar to Stratum 1 and Stratum 2 as described for Test Unit 1, and the reader is referred to stratigraphic descriptions for Test Unit 1. One lithic artifact was recovered from Stratum 1 in Test Unit 4. The thickness of Stratum 1 varies between 7 - 14 cm. Excavations were halted after the removal of 9 - 14 cm of Stratum 2.

ANALYSIS AND INTERPRETATION

Eighty-nine artifacts were identified from the surface, and twenty-seven artifacts were recovered from subsurface excavations, which included shovel tests. Tools observed on the surface included one quartzite core, two utilized argillite flakes, one retouched argillite flake, and two pieces of groundstone. Both groundstone pieces are manufactured from local sandstone. One piece is a small fragment of a metate. It measured 6.6 cm x 5.3 cm x 1.8 cm. The other groundstone is a disc shaped object with smoothing on both sides. It appears to be complete and may have functioned as a covering or lid. This measures 10.5 cm x 10.4 cm x 2.2 cm. The subsurface artifact assemblage consisted entirely of nontool lithic debitage (Table 9.8).

The nontool lithic assemblage was analyzed using the categories established by Sullivan and Rozen (1985). Based on the percentages of the debitage categories, a few inferences can be made about the lithic production activities at the site. According to Sullivan and Rozen (1985), low numbers of complete flakes and the lack of cores or core fragments suggest that core reduction was not a primary focus at this site. On the other hand, the high percentage of debris, according to Sullivan and Rozen (1985), may be interpreted as the byproducts of intensive core reduction. Although tool manufacture may have occurred at this site, it is probable that intensive core reduction may have been the primary lithic activity at the site.

Table 9.8 Nontool lithic debitage, 5LA4606, PCMS.

Complete		Broken		Fragment		Debris		Total		
N	%	N	%	N	%	N	%	N	%	
11	12.94	15	17.65	19	23.53	38	45.88	83	100	Surface
6	22.22	2	7.41	9	33.3	10	37.04	27	100	Subsurface
17	15.18	17	15.18	28	25.89	48	43.75	110	100	

Lithic material types for the assemblage were separated into the following major raw material types: argillite (46 [40.35%]), chert (22 [19.3%]), basalt (22 [19.3%]), quartzite (10 [15.79%]), chalcedony (5 [4.39%]) and hornfels (1 [.88%]). The basis for the material type designations are those categories described by Ahler (1992) for the PCMS. All of the material types at this site with the exception of argillite can be obtained from the Purgatoire River gravel deposits. Argillite is locally available in the PCMS where it outcrops near the east end of the Hogback-basaltic dike at the southern border of the PCMS. This is a distance of 39 km (24 mi) from the site. Despite this distance, argillite is the most dominant material type at the site, and this demonstrates a preference by the inhabitants for this material type. Basalt outcrops are present in the Hogback but are also present in the gravel near the confluence of the Purgatoire River and Chacuaco Creek, a distance of 6.6 km (4.1 miles) from the site. Chert, chalcedony, and quartzite can also be obtained from tributaries of the Purgatoire River.

The results of eligibility testing at 5LA4606 did not reveal a buried cultural horizon. Artifacts extend from the surface to 20 cm below the surface. Equal amounts of artifacts were recovered from 0 - 10 cm and from 10 - 20 cm below the surface. It appears that artifacts occur in the upper eolian stratum. Test Unit 2 produced the greatest number of subsurface artifacts below 10 cm (5), including one artifact from 20 - 30 cm below the surface. This unit, however, had obvious rodent disturbance, and this may account for the deeper artifacts. Seven (24%) of the twenty-nine shovel tests produced subsurface artifacts. Nineteen lithic artifacts were recovered from subsurface excavations. Nine of these were found in the water screen samples, of which three would have been retained in the ¼" mesh.

No features or buried cultural horizon were identified from either the surface or subsurface. The shallow soil is developed in eolian and residual sediments. A compacted silt loam with caliche was noted at the bottom of all test units.

Temporal affiliation of the site is based on the presence of one stemmed projectile point base that was collected during the initial site inventory. No other diagnostic artifacts were recovered from the site.

CONCLUSIONS

Eligibility testing at site 5LA4606 was conducted by Fort Lewis College from September 9 through September 11, 1994. The site was mapped and surface artifacts were analyzed. Twenty-nine shovel tests and four 1 x 1 m test units were excavated during eligibility testing. Evidence of either subsurface features or cultural horizons was not found. Field and laboratory analysis did not produce evidence for a buried Middle Archaic horizon at this site; therefore, the site is not considered to be eligible for nomination to the NRHP according to the research design for this project. No further archaeological work is recommended at this site.

CHAPTER 10

5LA4632

INTRODUCTION AND LOCATIONAL INFORMATION

Eligibility testing at site 5LA4632 was conducted from September 10 through September 12, 1994. A total of 8.5 person days were spent at the site. Archaeological investigations included the production of a site map, field analysis of visible surface artifacts, and the excavation of twenty-one shovel tests and two 1 m x 1 m test units. Flaked lithic and ground stone artifacts were recovered from shovel tests at depths of up to 70 cm below the surface. Twelve of twenty-one shovel tests produced buried artifacts while both test units indicated a good probability for a buried cultural horizon. A radiocarbon date was obtained on charcoal from this probable cultural horizon, and it places the occupation of this site during the Late Archaic or Early Ceramic Periods. Based on the presence of significant numbers of buried artifacts and the possible association with a buried cultural horizon, the site is deemed eligible for nomination to the NRHP under Criterion D, the potential to yield significant information on the lifeways of the prehistoric population of the PCMS.

Site 5LA4632 is a small lithic and ground stone scatter measuring 3,850 m^2. It is located along an east to southeast facing bench within the Arroyo/Canyon Landscape Unit (Figure 1.2). The bench is formed by the canyon rim of Bent Canyon to the south and east, and a low sandstone rimrock to the north and west. Site topography is fairly flat with a gentle downward slope from the base of the rimrock to the edge of Bent Canyon (Figure 10.1). Bent Canyon, an intermittent water supply, is about 500 m southeast of the site and merges with the Purgatoire River 3.6 km (2.25 mi) to the southeast. Figure 10.2 is a site map showing subsurface archaeological units and topographic detail.

SITE SETTING

Geology

On-site bedrock belongs to the Lower Cretaceous Dakota Sandstone Formation which outcrops as rimrock behind the site to the north and west. The exposure of Dakota Sandstone at this site is a particularly friable one, typical of an ancient stream facies with rounded and subrounded sand grains, quartz and quartzite pebbles, and occasional chert and chalcedony pebbles. Because the sandstone facies is friable, it erodes easily, furnishing a constant supply of sediments to the site.

Soils

Soils are classified as Travessilla-Wiley-Villagreen (U.S.S.C.S 1983). A definite soil, however, was not identified in either excavation unit. A very thin, organic layer with roots and

Figure 10.1 General site overview, 5LA4632, PCMS. View to the northeast.

vegetation overlays a thick stratum of medium-grain, yellow-brown sand, a "K" horizon. The sand weathers from the nearby outcropping sandstone rimrock, and is colluvially deposited at the site. Some eolian sediments are mixed with the residual deposits, but eolian sediments account for a very small portion of the total sediment supply. The sand overlays an undulating bedrock topography. This undulating topography collects sediments unevenly across the site. The sediments are deepest near the center of the site and gradually become more shallow to the north and south as the bedrock rises to the surface.

Vegetation

The on-site vegetation consists of juniper, yucca, prickly pear cactus, cholla, snakeweed, skunkbrush, red three-awn grass, needle-and-thread grass, sagebrush and four o'clocks. Vegetation along the rim is a mix of pinon-juniper woodland with mixed prairie grasses. An open prairie vegetation community is present 50 m from the site to the north and west.

PREVIOUS SURVEY RESULTS

This site was recorded by personnel from Larson-Tibesar Associates during the 1987 survey of Zones D and E of the PCMS (Colorado State Site Form, 5LA4632). This survey was

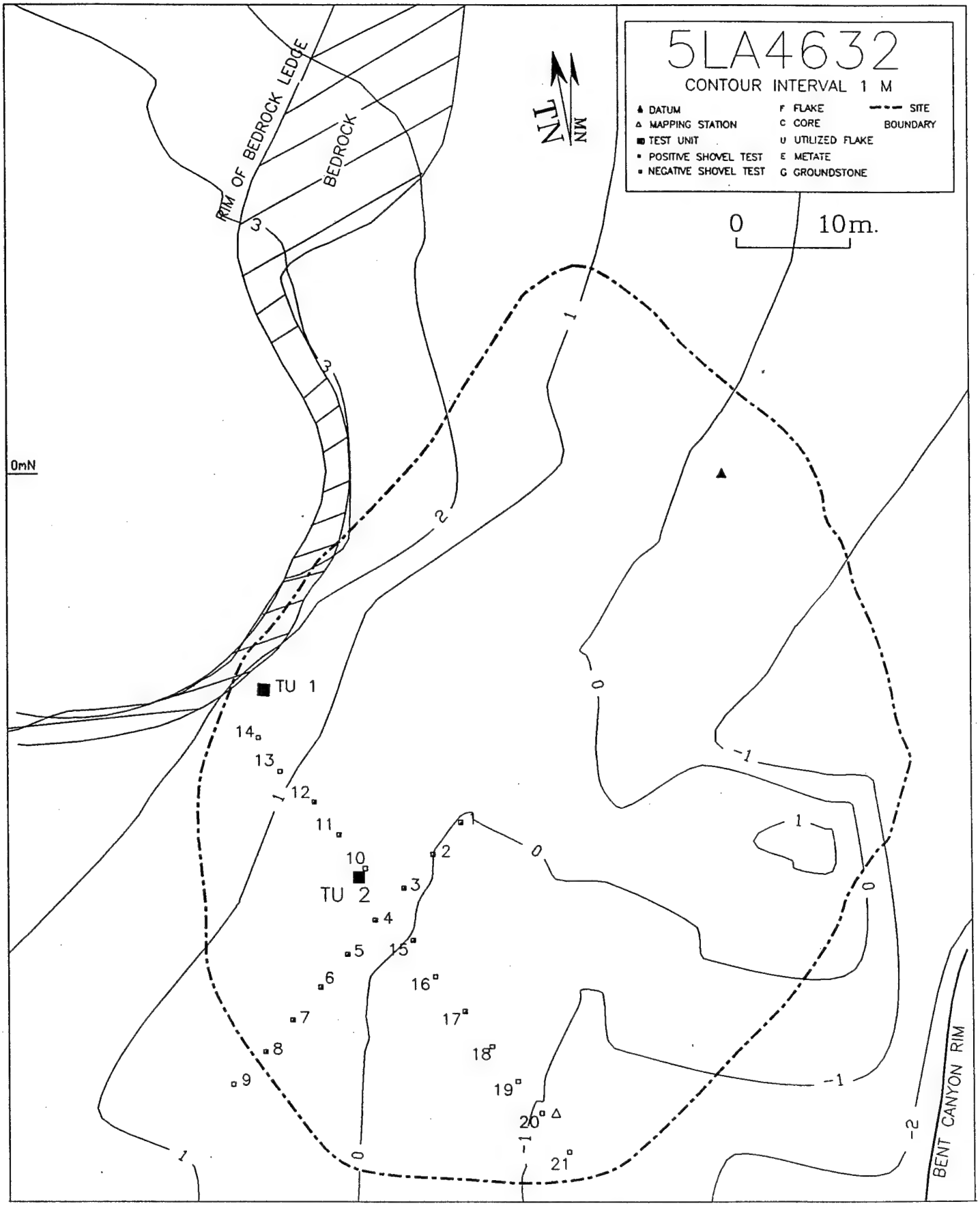

Figure 10.2 General site map, 5LA4632.

conducted to satisfy Section 106 requirements to allow training to proceed. The survey results were used as an independent test of a predictive site location model developed for the PCMS (Kvamme 1984). The site was described as a small (50 m x 30 m) flaked lithic scatter of less than a dozen flakes and one utilized flake. The site was mapped and an estimated 10 percent artifact sample was collected. The site was described as containing extensive eolian sediments, and thereby possibly associated buried deposits. The archaeologists recommended additional testing to evaluate the potential for significant subsurface deposits. Other than the site's receiving protective flagging, no further archaeological work was conducted prior to eligibility testing by Fort Lewis College.

RESULTS OF ELIGIBILITY TESTING

Surface Reconnaissance

The original PVC site datum was relocated, and surface investigations began with a pedestrian transect inventory of the site area. Two artifact concentrations were recognized in the field, and the site boundaries were increased from 30 m x 50 m to 50 m x 50 m to include both concentrations. All surface artifacts were pinflagged. Forty-seven lithic artifacts and three pieces of groundstone were mapped and analyzed in the field (Figure 10.3, Table 10.1).

Subsurface Testing

Subsurface testing included twenty-one shovel tests (each spaced 4 meters apart) and two 1 m x 1 m test units.

Shovel Tests Two shovel test lines were placed across the site. Shovel tests were located every four meters apart. The shovel tests ranged in depth from 26 cm to 83 cm with an average depth of 58 cm. The shovel tests were excavated to sandstone bedrock, or a compacted caliche horizon, or until the depth in the shovel test was to great too continue excavation without widening the diameter of the shovel test. This was usually about 70 cm below the surface. A total of 21 shovel tests were excavated at the site (Table 10.2). Twelve of the twenty-one tests, or 60 percent, contained subsurface artifacts. This is the highest percentage of artifact-bearing shovel tests from any site tested during this project. One mano, one rotated core, a metate fragment, and seventeen flakes were recovered from the shovel tests.

Test Unit Excavations Two 1 m x 1 m test units were excavated at the site (Table 10.3). Both test units were excavated in 10 cm arbitrary levels to sandstone bedrock. Subsurface artifacts were recovered from both test units. A darker sand stratum with charcoal and artifacts was identified in both test units. This stratum is interpreted to be a buried cultural horizon.

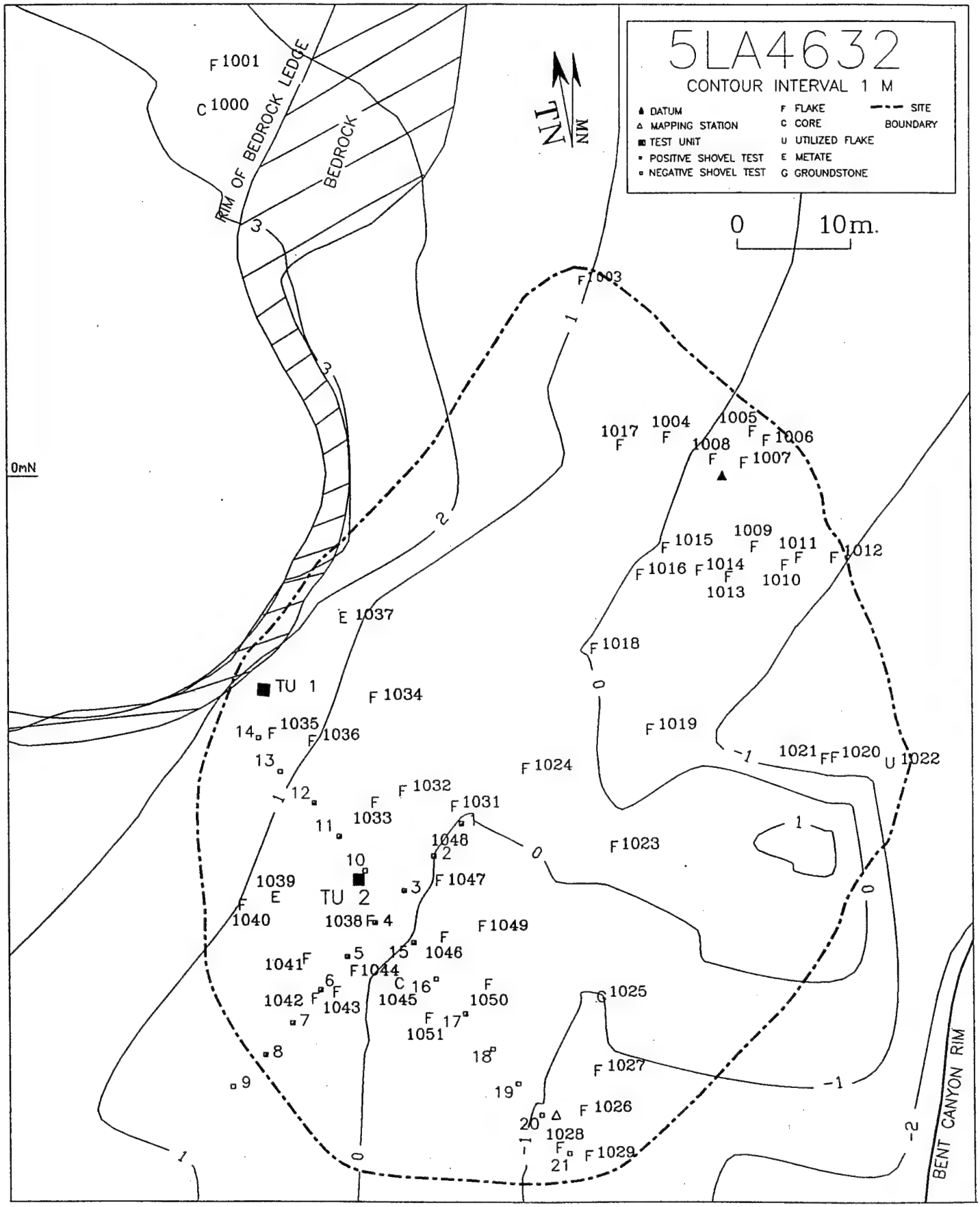

Figure 10.3 General site map with surface artifacts; 5LA4632.

Table 10.1 Surface artifacts, 5LA4632, PCMS.

Map No.	Artifact Type	Debitage Category	Material Type
1000	Core	NA	Quartzite
1001	Flake	Complete	Quartzite
1003	Flake	Complete	Quartzite
1004	Flake	Complete	Fossil Chert
1005	Flake	Complete	Fossil Chert
1006	Flake	Fragment	Fossil Chert
1007	Core Fragment	NA	Chert
1008	Flake	Fragment	Chert
1009	Flake	Fragment	Chert
1010	Debris	Debris	Chert
1011	Debris	Debris	Quartzite
1012	Flake	Complete	Chert
1013	Flake	Complete	Quartzite
1014	Debris	Debris	Quartzite
1015	Debris	Debris	Quartzite
1016	Flake	Complete	Quartzite
1017	Flake	Broken	Quartzite
1018	Debris	Debris	Quartzite
1019	Debris	Debris	Quartzite
1020	Flake	Broken	Quartzite
1021	Debris	Debris	Quartzite
1022	Utilized Flake	NA	Argillite
1023	Debris	Debris	Argillite
1024	Debris	Debris	Quartzite
1025	Metate Fragment	NA	Sandstone
1026	Flake	Broken	Quartzite
1027	Debris	Debris	Chalcedony
1028	Flake	Fragment	Quartzite

Map No.	Artifact Type	Debitage Category	Material Type
1029	Flake	Broken	Chert
1031	Debris	Debris	Quartzite
1032	Flake	Fragment	Quartzite
1033	Flake	Complete	Quartzite
1034	Flake	Broken	Quartzite
1035	Flake	Complete	Petrified Wood
1036	Debris	Debris	Quartzite
1037	Metate	NA	Sandstone
1038	Flake	Complete	Petrified Wood
1039	Metate Fragment	NA	Sandstone
1040	Debris	Debris	Quartzite
1041	Debris	Debris	Quartzite
1042	Flake	Complete	Quartzite
1043	Debris	Debris	Quartzite
1044	Flake	Complete	Basalt
1045	Core Fragment	NA	Quartzite
1046	Debris	Debris	Quartzite
1047	Debris	Debris	Basalt
1048	Debris	Debris	Sandstone
1049	Debris	Debris	Quartzite
1050	Flake	Fragment	Quartzite
1051	Debris	Debris	Quartzite

Table 10.2 Shovel test results, 5LA4632, PCMS.

No.	Depth of Stratum (cm)	Stratigraphic Description	Materials Recovered
1	61	loose, granular fine to medium fine sand (10YR 4/3 brown to dark brown) to sandstone bedrock	1 lithic artifact
2	60	Same as Shovel Test 1 with more compacted sand with caliche at the bottom	1 mano, 20 cm bgs
3	61	Same as Shovel Test 1 to sandstone bedrock	1 rotated core, 20-30 cm bgs
4	55	Same as Shovel Test 1 to sandstone bedrock, charcoal noted	1 lithic artifact, 40-50 cm bgs
5	65	Same as Shovel Test 1 to sandstone bedrock, charcoal noted	1 lithic artifact
6	83	Same as Shovel Test 1, bedrock was not encountered	3 lithic artifacts
7	78	Same as Shovel Test 1, bedrock was not encountered	2 lithic artifacts
8	64	Same as Shovel Test 1 to contact with hard, compacted sand with silt and sandstone gravel	1 lithic artifact
9	56	Same as Shovel Test 1 to contact with hard, compacted sand with silt and sandstone gravel	No artifacts
10	77	Same as Shovel Test 1 to sandstone bedrock	No artifacts
11	80	Same as Shovel Test 1 to sandstone bedrock	3 lithic artifacts
12	50	Same as Shovel Test 1 to impenetrable roots, soil probe encountered bedrock at 90 cm	1 lithic artifact
13	50	Same as Shovel Test 1 to sandstone bedrock	No artifacts

No.	Depth of Stratum (cm)	Stratigraphic Description	Materials Recovered
14	35	Same as Shovel Test 1 to sandstone bedrock	No artifacts
15	71	Same as Shovel Test 1 to compacted sand, sandstone and caliche gravel	1 groundstone fragment, 4 lithic artifacts
16	79	Same as Shovel Test 1 to compacted sand, sandstone and caliche gravel	No artifacts
17	65	Same as Shovel Test 1 to roots and compacted sand	1 lithic artifact
18	38	Same as Shovel Test 1 to impenetrable roots	No artifacts
19	26	Same as Shovel Test 1 to decomposing bedrock	No artifacts
20	35	Stratum 1 - Compacted sandy loam with caliche and sandstone gravel Stratum 2 - Very compacted sandy loam with silt, compacted caliche and sandstone gravel, yellowish brown)	No artifacts
21	32	Same as Stratum 2, Shovel Test 20	No artifacts

Table 10.3 Test unit results, 5LA4632, PCMS.

Test Unit No.	Size (m)	Layers	Levels	Final Depth (bgs)
1	1 X 1	1	2	23 cm
2	1 X 1	1	7	76 cm

Test Unit 1 Test Unit 1 was located along the base of the rimrock where erosion was minimal. Erosion from slope wash was believed to be a factor in the translocation of artifacts across the site; if the site contained an in situ cultural horizon, it most likely would be encountered at the base of the rimrock. Two 10 cm levels were excavated from Test Unit 1. No artifacts were recovered from the first level, 17 lithic artifacts were recovered from the second level, and 2 lithic artifacts were recovered from a crevice in the bedrock (Table 10.4). A large, orthoquartzite chopper and a flake that had been removed from the chopper were mapped in place in the unit. Sandstone bedrock was reached at about 23 cm below the surface. A small crevice continued for another 40 cm below the bedrock (Figure 10.4).

Table 10.4 Results of Test Unit 1, 5LA4632, PCMS.

Layer (No.)	Level (No.)	Depth (bsg)	Materials Recovered
1	1	10 cm	No artifacts
1	2	20 - 23 cm	16 lithic artifacts 1 chopper
Crevice			2 lithic artifacts

Stratigraphy. The north and west walls of the unit were mapped and photographed. A profile drawing is included as Figure 10.4 to aid in the following stratigraphic discussion.

Stratum 1 is a brown, (10YR 5/3) medium-grained sand. It is a residual deposit from the nearby weathered sandstone rimrock. Large and small angular sandstone fragments, roots and other organic matter are present in the stratum. The sediments did not react with hydrochloric acid. No artifacts were recovered from the stratum.

Stratum 2 is a mottled, dark grayish brown, (10YR 4/2) to dark-brown, (10YR 4/3) medium-to-fine sand. Sediments did not react with hydrochloric acid. These sediments are formed from weathered bedrock. Large and small

angular sandstone fragments occur along with lithic artifacts and some charcoal flecks. This stratum is interpreted as a cultural horizon. Microscopic examination of the soil sample collected from the stratum produced what appears to be oxidized sediments.

Stratum 3 is a dark brown (10YR 4/3 to 10YR 3/3) medium to fine sand. The darker hue is caused by organic enrichment. Large and small, angular sandstone rock are common in the stratum. These sediments did not react with hydrochloric acid. The lower boundary is abrupt with the underlying bedrock. No artifacts were recovered in this "K" horizon.

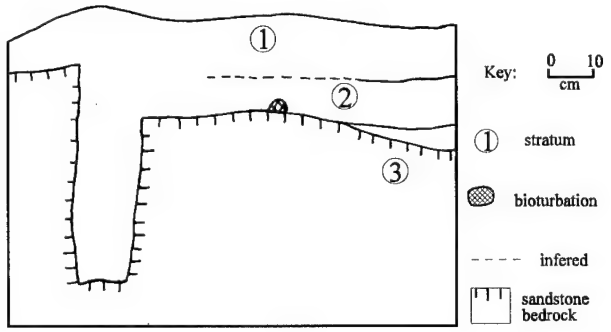

Figure 10.4 North wall profile, Test Unit 1, 5LA4632.

Test Unit 2 This test unit was located in an area of the site where shovel testing had demonstrated that artifacts were buried up to 70 cm below the ground surface. The unit was excavated in 10 cm levels to a total depth of 76 cm below the surface (Table 10.5). Seventeen lithic artifacts were recovered from this test unit. These artifacts occurred in five of the seven levels. Level 4 and Level 5 contained the majority of artifacts. Charcoal was observed in Levels 5, 6, and 7, and a sample large enough for a radiocarbon date was collected from Level 7 just above the bedrock. This sample produced a radiocarbon date of cal A.D. 85 to A.D. 390 (2 sigma), and an intercept radiocarbon age with calibration curve of cal A.D. 235 (Appendix 1).

Table 10.5 Results of Test Unit 2, 5LA4632, PCMS.

Layer (No.)	Level (No.)	Depth (bgs)	Materials Recovered
1	1	10 cm	No artifacts
1	2	20 cm	2 lithic artifacts
1	3	30 cm	2 lithic artifacts
1	4	40 cm	5 lithic artifacts
1	5	50 cm	5 lithic artifacts
1	6	60 cm	3 lithic artifacts
1	7	70 - 76 cm	No artifacts

Stratigraphy. Although Stratum 2 and Stratum 3 are much thicker in Test Unit 2, the stratigraphy in this test unit mirrors that of Test Unit 1. The source of the sediments is eroded sand from the sandstone outcrop north of the site. A possible cultural horizon was identified beginning about 60 cm below the surface. The east and north walls were cleaned, photographed, and profiled. Three strata were identified. Figure 10.5 is a drawing of the east wall. The following is a description of the unit stratigraphy.

Stratum 1 is a brown (10YR 5/3) sand with large and small angular sandstone clasts. The lower boundary is gradual. There was no reaction with hydrochloric acid, and there were no artifacts recovered from this root zone of the "K" horizon.

Stratum 2 is a dark yellowish brown, (10YR 4/4) sand. It is slightly compacted with large and small, angular sandstone. The lower boundary is clear. There was no reaction to hydrochloric acid. Artifacts were recovered in the stratum.

Stratum 3 is a dark yellowish brown (10YR 4/4) sand with mottled charcoal. This stratum is slightly compact. The sediments did not react with hydrochloric acid. Small and large angular sandstone and lithic artifacts appeared in the stratum. Stratum 3 is interpreted to represent a probable cultural horizon. This stratum rests directly on sandstone bedrock.

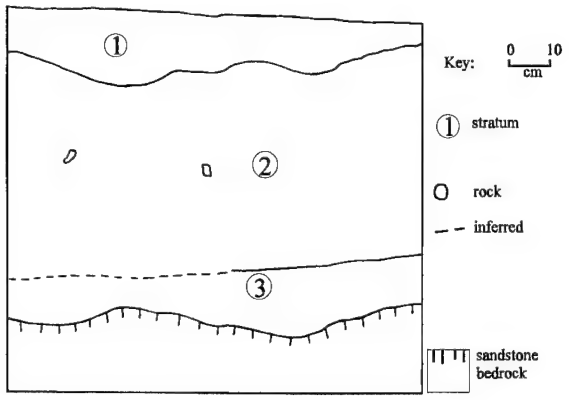

Figure 10.5 East wall profile, Test Unit 2, 5LA4632.

ANALYSIS AND INTERPRETATION

Fifty artifacts were mapped on the surface; forty-seven lithic artifacts, a complete metate and two metate fragments. One core tool, two core fragments, and a utilized flake were the lithic tools recorded from the surface during eligibility testing; the remaining forty-three lithic artifacts represent flaking debitage. Subsurface testing produced one groundstone fragment, a complete mano, one rotated core, one chopper, and fifty-three pieces of lithic debitage. This is one of the few sites tested during this project that produced more artifacts from the excavations than were mapped on the surface. A large number of the subsurface artifacts (21) were recovered from shovel tests, which indicates that the cultural deposit is vertically and horizontally substantial. The flaked lithic tools represented are all expedient varieties.

The debitage from the surface was analyzed in the field using the debitage categories described in Sullivan and Rozen (1985). The debitage recovered from subsurface context was separated into the same debitage categories used in the field analysis. The breakdown of debitage classes from both surface and subsurface artifacts is provided in Table 10.6. The cumulative total for both subsurface and surface is almost evenly distributed among the various categories. Surface and subsurface percentages, however, stand in marked contrast with each other. This is particularly noticeable in the category of flaking debris - a high percentage of flaking debris from the surface versus a very low percentage from the subsurface. The debris category is interpreted by Sullivan and Rozen (1985) as consisting of pieces of shatter from broken striking platforms and bulbs of percussion. The relatively large number of complete flakes, cores, and core fragments supports the premise that a primary activity at the site was intensive core reduction, whether reducing larger items for easier transport or, alternatively, producing expedient tools for on-site use.

Table 10.6 Nontool lithic debitage, 5LA4632, PCMS.

Complete		Broken		Fragment		Debris		Total		
N	%	N	%	N	%	N	%	N	%	
11	25.5	6	14	6	14	20	46.5	43	100	Surface
16	30.2	12	22.6	20	37.8	5	9.4	53	100	Subsurface
27	28.1	18	18.8	26	27.1	25	26	96	100	Total

The subsurface assemblage showed a more even percentage distribution among flaking categories with the exception of the low percentage of debris. No obvious explanation can be made for the discrepancy between surface and subsurface assemblages; however, some possible explanations include sampling bias and uneven artifact distribution over the site due to the translocation of artifacts in a sand matrix. Rozen and Sullivan (1985) address the problem of artifact breakage on an individual site basis. These authors suggest that in a sand matrix (such as 5LA4632) artifact breakage from cattle or pedestrian traffic is minimized through the process of horizontal translocation in the soft sand matrix, and through rapid burial.

The predominant material type class for both surface and subsurface flaked lithics is quartzite, followed by chert (Table 10.7). Quartzite and chert can be obtained from the Dakota sandstone. The low occurrence of material types that are not available in the immediate vicinity (argillite, hornfels, basalt) supports the explanation that the primary lithic activity was local procurement and intensive core reduction.

Table 10.7 Lithic raw material types, 5LA4632, PCMS.

Quartzite	Chert	Chalcedony	Basalt	Argillite	Hornfels	Sandstone	
32	9	1	2	2	0	1	Surface
36	12	3	2	1	1	0	Subsurface
68	21	4	4	3	1	1	Total
66.7	20.6	3.9	3.9	2.9	1	1	Percent of Total

Because the site is located within a sand matrix, it is subject to some problems from horizontal and vertical artifact migration. The processes of rapid sediment accumulation, colluviation, and pedestrian activities by humans can cause substantial displacement of artifacts (Gifford-Gonzalez et al. 1985); therefore, with the exception of the larger groundstone artifacts,

surface artifacts should not be considered good indicators of artifact distribution. On the other hand, sediment accumulation through colluviation has the advantage of rapidly burying artifacts and features.

Two pieces of groundstone, a complete sandstone mano and a small fragment, were recovered during shovel testing. The mano is manufactured from a sandstone river cobble. Bifacial grinding and smoothing are present on the lateral surfaces, and there is slight pecking on the lateral edges with substantial battering on both ends. The mano measures 13 cm long, 7 cm wides, and 6 cm thick.

Four samples were submitted for pollen analysis: three from stratigraphic layers and a single pollen wash sample from a buried mano (Appendix II). The results from the pollen analysis showed little of interest in the stratigraphic samples. The upper stratum sample was sent as a control sample. This was the only stratum that produced pollen in sufficient quantities to be statistically significant. This sample was well preserved and dominated by juniper pollen, with considerably smaller amounts of Chemo-*Am* and Other Compositae pollen (Rabbitbrush, Snakeweed, Sunflower, & Others). Smaller amounts of sagebrush, pinon, and other pine pollen were observed along with a single grain of pondweed (Potamogeton) or cattail (Typha), Neither of these riparian species are present at the site today, but standing water may have been present in the past if the climate was slightly wetter. Also, water funnels from the sandstone rimrock and collects along the base of the sandstone where it could have formed small pools. Another explanation for the possible cattail pollen is that it could have been transported via wind from stock ponds in the vicinity (less than a mile away).

A pollen wash was completed on a buried mano recovered from a shovel test about 20 cm below the surface. This sample contains the most unusual pollen assemblage from the group of samples submitted for pollen analysis from the (Appendix II). The sample is dominated by Other Compositae (33.3 percent) which includes Rabbitbrush, Snakeweed, Sunflower, and Others, pollen with smaller amounts of Cheno-*Am* (Saltbush, Goosefoot, Pigweed, and Others) and juniper pollen. No other samples from this testing phase produced such a high percentage of Cheno-*Am*, an insect-pollinated pollen type commonly of economic importance to prehistoric populations. The lack of pollen aggregates from the sample, however, sheds some doubt on its use as an economic resource.

CONCLUSIONS

Eligibility testing at this site consisted of EDM mapping and surface artifact analysis, and the excavations of thirty-one shovel tests and two test units. Prehistoric activities conducted at the site include core reduction, expedient tool manufacture, and vegetal processing. Although the presence of groundstone was not mentioned on the original survey form, a complete metate and two metate fragment were observed on the surface, while a complete mano and a metate fragment were recovered from subsurface investigations. The groundstone indicates probable vegetal processing and possibly even processing of a variety of Other Compositae or Cheno-*Am*. Depending on the kind of vegetation processed, one would expect to encounter hearths or

roasting features. Additionally, occupants at 5LA4632 were bringing local raw materials to the site possibly for expedient tool production.

A microclimatic situation is made possible at the site through a combination of site location, temperature, and moisture. The site faces southeast where it is exposed to direct south and east sunlight. The rimrock absorbs the heat from the sun and slowly releases the heat throughout the course of the day. Rainwater is funneled onto the site from the rimrock and is rapidly absorbed into the sand matrix. Because the site is protected from harsh winds due to its location beneath the rimrock and the barrier formed by the trees, it experiences a lower rate of evaporation. The result of these environmental conditions is that the site can be hot and humid. These were the prevailing conditions during September when FLC was testing the site. While the site is inhospitable for most of the summer months, it is probably very comfortable from late fall through late spring.

A buried cultural horizon is present at the site just above bedrock. This horizon contains artifacts, charcoal, oxidation, and a good potential for an associated activity surface with features. A radiocarbon intercept date of cal A.D. 235, places this buried horizon within the Late Archaic or Early Ceramic Periods. Based on the results of the eligibility testing at 5LA4632, this site is considered to be eligible for nomination to the NRHP under Criterion D: the potential to yield significant information about the prehistoric population of the PCMS.

CHAPTER 11

5LA4854

INTRODUCTION AND LOCATIONAL INFORMATION

Site evaluation for the NHRP was conducted at 5LA4854 by Fort Lewis College from August 23 through August 24, 1994. A total of 11 person days were spent at the site. Work completed at the site consisted of EDM mapping, surface reconnaissance, and test excavation. Five shovel tests and four test units were excavated. The results of field work and laboratory analysis were used to determine that the site does not meet the criteria for eligibility for nomination to the NRHP. No further archaeological work is recommended at the site.

5LA4854 consists of one stone enclosure and a single projectile point base. The site is located on a low hummock formed by a sandstone bedrock remnant. The surrounding area is an open grassland steppe (Figure 1.2). This broad grassland expanse is located between the Bear Springs Hills and the Black Hills with the site found near the center of this open area. The immediate site terrain is relatively flat with a gentle slope to the east towards Red Rock Canyon (Figure 11.1). Lockwood Arroyo is 3.4 km (2 miles) south of the site. Pinon Canyon Maneuver Site Road #1 is 230 m south (328°) of the site. Both Lockwood Arroyo and Red Rock Canyon drain to the southeast into the Purgatoire River that is 13.1 km (8.1 miles) east/southeast of the

Figure 11.1 General site overview. View to the north.

site. Water resources are not readily available. Legal descriptions and other pertinent information for the site are presented in Table 1.1. Figure 11.2 is a map of the site showing topographic details, site boundaries, feature location, and subsurface excavation units.

SITE SETTING

Geology

Bedrock geology is the Cretaceous age Dakota Sandstone Formation. The site sits on a remnant of sandstone bedrock with exposed gravel and angular sandstone.

Soils

Soils at the site are described as Travessilla-Wiley-Villagreen (U.S.S.C.S. 1983). They are sandy due to the underlying sandstone. The soil profiles are composed of two primary soil strata: the upper soil is a thin eolian (Soil "A") horizon, and an underlying soil developed in eolian and residual deposits. Eolian sediments are dark-brown, dark yellow-brown, or grayish brown sandy silt or sandy loam. The underlying sediments are a brown silt loam to sandy loam. Sandstone bedrock depth ranges from the surface up to 50 cm in depth. Caliche was noted in all subsurface explorations.

Vegetation

The vegetation is consistent with a prairie grassland community. Grasses and small forbs are dominant. A few small junipers dot the hummock.

PREVIOUS SURVEY RESULTS

5LA4854 was inventoried in July of 1987 by personnel from Larson-Tibesar Associates (Colorado State Site Form, 5LA4854). The site was recorded as having one stone enclosure (Feature 1). One side-notched projectile point base, dating possibly to the Middle Ceramic period, was found approximately 25 m southwest of the feature. No other cultural material was observed at the site. The site was considered potentially eligible for nomination to the NRHP, and it was stated that the site should be protected or investigated further. This recommendation was based primarily on the potential of the feature. Architectural remains on the steppe areas are rare. Although the function or use of the feature was not apparent to the recorders, they suggested its use as a hunting blind. The projectile point was collected. The point was analyzed and included in the survey report. Aside from the site's receiving protective flagging, no further archaeological work was conducted prior to eligibility testing by Fort Lewis College.

RESULTS OF ELIGIBILITY TESTING

The old datum was found laying on the ground within Feature 1. Based on the original feature map, the datum was 1.5 m from its original location within the feature. A new datum

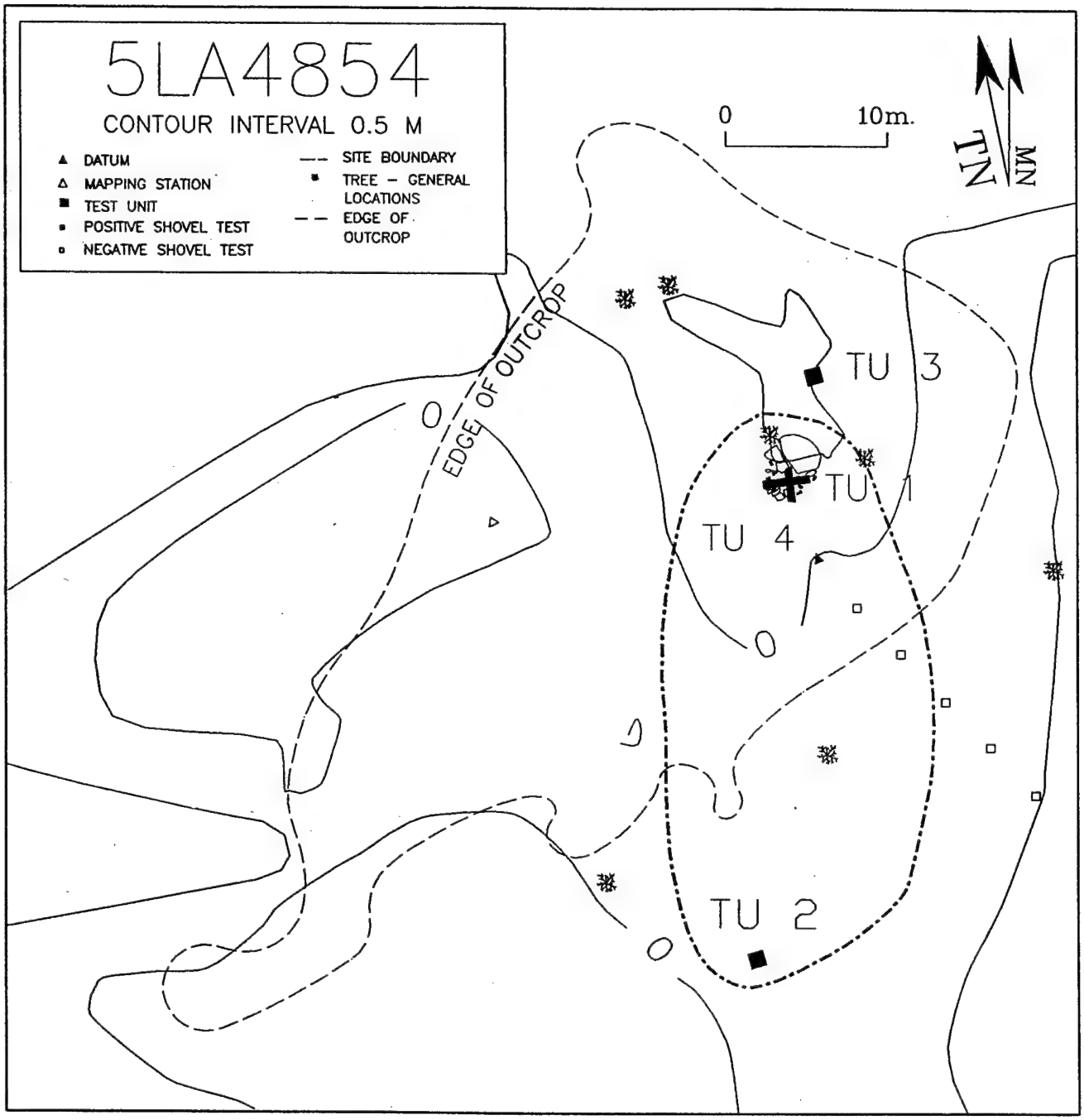

Figure 11.2 General site map, 5LA4854.

(rebar) was placed a little over 3 meters southwest of the feature. After an exploratory site inventory, the site was surveyed using systematic transects. No cultural material was observed on the surface.

Subsurface Investigations

Five shovel tests and four test units were excavated at 5LA4854. The location of these tests are shown in Figure 11.2.

Shovel Tests A line of shovel tests was placed at four meter intervals extending southward from the newly established datum. These shovel tests were placed in the only area near the possible feature that offered the potential for soil deposition in an otherwise bedrock exposed landscape. Shovel tests were excavated to sandstone bedrock in all but one of the shovel tests. The other shovel test (ST5) was stopped after encountering decomposing sandstone. The depth of shovel tests varies from 5- 57 cm (Table 11.1) with an average depth of 23 cm. No artifacts were recovered from this subsurface exercise. The soils include an initial (5- 30 cm) layer of silty sand followed by either decomposing sandstone or consolidated sandstone bedrock.

Test Unit Excavations Four test units were excavated at 5LA4854. Test unit 1 and 4 were placed over Feature 1. Test Unit 2 was excavated in the area where the projectile point base was located. Test Unit 3 was placed north and upslope from Feature 1. The units were excavated in arbitrary 10 cm levels within stratigraphic layers (Table 11.2).

Table 11.2 Test unit results, 5LA4854, PCMS.

Test Unit No.	Size (m)	Layers	Levels	Final Depth (bgs)
1	0.5 x 3	1	2	18 cm
2	1 x 1	3	5	52 cm
3	1 x 1	2	3	26 cm
4	0.5 x 2	1	1	18 cm

Test Units 1 and 4 Test Unit 1 and Test Unit 4 are discussed together because both units were concerned with the exploration of Feature 1. Feature 1 is a small (3 x 3 m) semicircle of medium to small blocky sandstone slabs that butt up against two large naturally occurring sandstone boulders to form a possible enclosure (Figure 11.3). These boulders form the northeastern quarter of the enclosure. None of the sandstone slabs is in an upright position, and only a few are at slight angles. The condition of the semicircle of rock when originally recorded was described as being in a complete state of rubble. A comparison of the plan view drawings of the feature made during site identification and the testing phase suggests that the feature's physical appearance has changed little.

Table 11.1 Shovel test results, 5LA4854, PCMS.

No.	Bottom Depth of Stratum (cm)	General Stratigraphic Description	Materials Recovered
1	5 cm	Silt sand to sandstone bedrock	No artifacts
2	10 cm	Same as Shovel Test 1	No artifacts
3	14 cm	Same as Shovel Test 1	No artifacts
4	10 cm 30 cm	Silt with sand to degrading sandstone bedrock	No artifacts
5	30 cm 57 cm	Compacted silty sand to degrading to sandstone bedrock	No artifacts

Figure 11.3 Feature 1, stone enclosure, 5LA4854. View to the northwest.

Two 0.5 m wide test units (Test Units 1 and 4) bisected the feature to determine the feature's cultural significance (Figure 11.4). The test units were set up in such a way to extend where possible beyond the semicircle of rock. This was done to provide a profile of the area within and outside the feature. Due to the small size of the feature, 0.5 m wide units were used. This width still provided a visible profile and also retrieved a screened sample of nearly half of the feature. All sediments from the excavation of Feature 1 were screened through ⅛" wire mesh. Test Unit 1 was a 3 meter long east-west trench and Test Unit 4 was a 2 meter long north-south trench. The test units intersect near the center of the feature area. Two levels were excavated in Test Unit 1 (Table 11.3). One hornfels core fragment was recovered from Level 2. A two liter flotation sample was taken from the same area and depth as the core fragment.

Table 11.3 Results of Test Unit 1, 5LA4854, PCMS.

Layer	Level	Depth (bgs)	Artifacts
1	1	3 - 8 cm	No artifacts
1	2	1 - 18 cm	1 core fragment

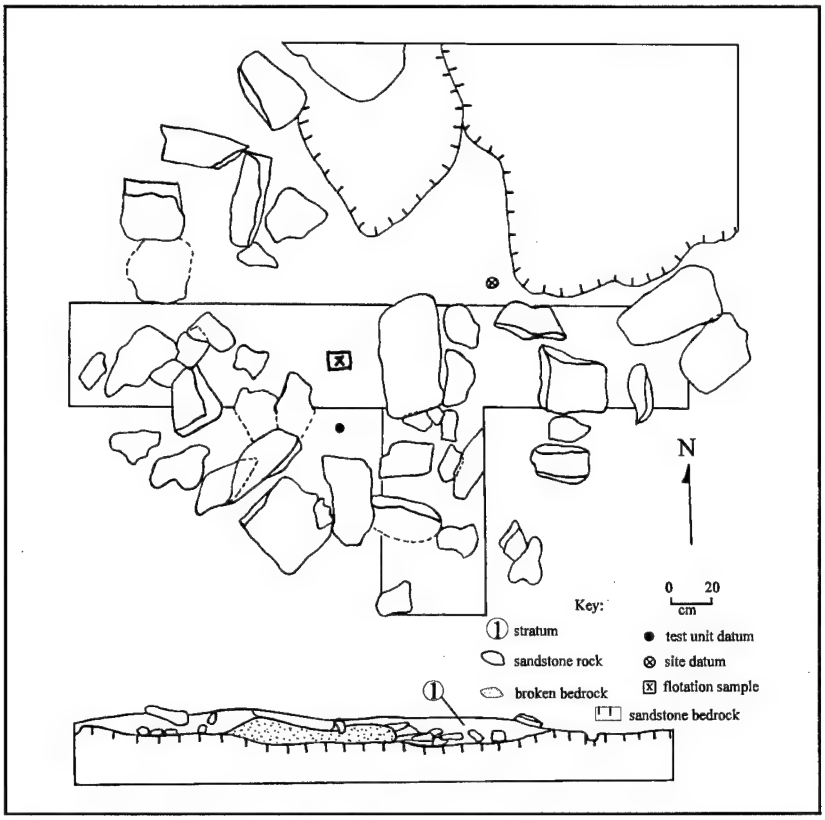

Figure 11.4 Plan view of Feature 1, Test Units 1 and 4, and North wall profile, Test Unit 1, 5LA4854.

Level 1 consisted of leveling off the unit by removing 3 cm - 8 cm of loose soil from the center of the unit to make that area the same height as the northwest corner of the unit. A datum was used to level the unit. The center of the unit had been stabilized by vegetation; however, either end of the unit was deflated. Level 2 was removed for the entire length of the unit. Solid bedrock was encountered after a few centimeters on both ends of Test Unit 1. The central portion of the unit had numerous small pieces of sandstone. It was within this matrix that the core fragment was found. The remainder of the level consisted of removing gravelly sediments to solid bedrock.

Stratigraphy The north wall of Test Unit 1 was cleaned and profiled (Figure 11.4). One stratigraphic unit was defined and is described below.

Stratum 1 is a brown sandy loam. The structure is loose to granular. Numerous small pieces of sandstone are present particularly in the center of the unit. Caliche was also noted. The lower boundary is solid bedrock. This stratum is a result of eolian and residual processes. The thickness of the stratum varies from 1 cm - 18 cm.

Test Unit 4 The excavated contents of Test Unit 4 were removed in a single level due to the results from Test Unit 1. One white chert flake was recovered from just inside the south wall of the rock alignment. The depth of the level varied between 0 and 18 cm. The level was terminated when sandstone bedrock was encountered (Figure 11.5)

The wall profile of Test Unit 4 did not differ from that of Test Unit 1, and the reader is referred to Test Unit 1 for a stratigraphic description.

Excavation within Feature 1 showed that if the feature was indeed an intentional stone alignment, it received only marginal or ephemeral use. There was no evidence of charcoal or oxidation, and a use surface was not evident. Sediments below the rock "wall" were 6 cm to 9 cm thick, suggesting that if the enclosure was purposeful, sediments were covering the bedrock when the area was utilized; thus, the bedrock did not serve as a surface. The two recovered artifacts were not found on the bedrock; however, they were found within the designated feature area. The wall profiles of Test Unit 1 and Test Unit 4 did not indicate any stratigraphic variability between the inside and the outside. Feature 1 may represent a hunting blind or temporary shelter, and most likely it was used for a single event.

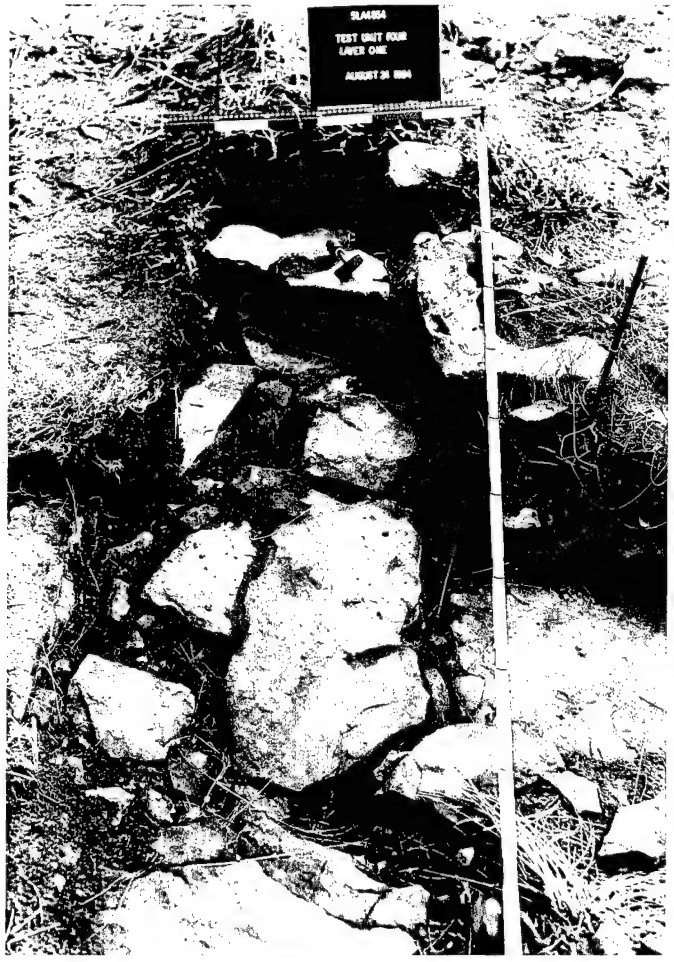

Figure 11.5 Base of Test Unit 4, 5LA4854. View to the south.

Test Unit 2. Test Unit 2 was placed in the general area of the previously collected projectile point base. The original site map was used to determine the test unit location. Five levels were excavated in Test Unit 2 (Table 11.4). No artifacts were recovered during the excavation. The first level consisted of removing several centimeters of the loose sediments and sod. Sandstone

bedrock was encountered in the fourth level. The south sloping bedrock covered most of the unit by the bottom of Level 4, and Level 5 took the entire unit down to bedrock.

Table 11.4 Results of Test Unit 2, 5LA4854, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	1 - 2 cm	No artifacts
2	1	7 - 12 cm	No artifacts
3	1	20 - 23 cm	No artifacts
3	2	24 - 37 cm	No artifacts
3	3	38 - 52 cm	No artifacts

Stratigraphy. The west wall was cleaned, photographed, and profiled. Figure 11.6 is the profile drawing of the west wall. Four stratigraphic units were defined, and they are described below.

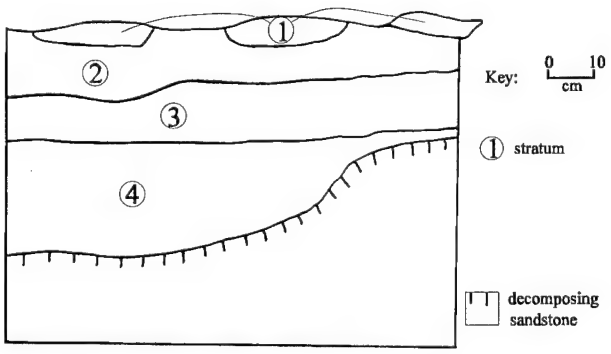

Figure 11.6 West wall profile, Test Unit 2, 5LA4854.

Stratum 1 is a grayish brown (2.5Y 5/2) sandy silt. This stratum is loose with no pedogenic structure. Sod and an occasional piece of sandstone are present in the stratum. This stratum is a thin Soil "A" horizon developed in eolian and residual sediments. The stratum thickness varies between 1 cm and 6 cm. The lower boundary is abrupt.

Stratum 2 is a grayish brown (2.5Y 5/2) silt loam. This stratum is hard with massive to blocky structure. Roots, caliche, and sandstone are present. The stratum is a weakly developed Soil "B" horizon developed in eolian and

residual deposits. The stratum thickness varies between 7 cm and 14 cm. The lower boundary is abrupt.

Stratum 3 is a brown (10YR 5/3) silt loam with some sand. The structure is blocky. Caliche and sandstone gravel are present. This stratum is a weak Soil "B" horizon developed in eolian and residual sediments. The stratum thickness varies between 9 cm and 14 cm. The lower boundary is gradual.

Stratum 4 is a pale brown (10YR 6/3) sandy loam. The structure is blocky to columnar. Caliche, large tabular sandstone, and iron oxide are present in the stratum. This stratum is the bottom of the Soil "B" horizon at the contact with the weathered "C" horizon. The stratum thickness varies between 2 cm and 26 cm. The lower boundary is abrupt where it overlies sandstone bedrock.

Test Unit 3. Test Unit 3 was placed north and upslope of Feature 1. The unit was placed in this area because the thicker vegetation denoted stable soil conditions. Three levels were excavated within two natural strata. No artifacts were recovered (Table 11.5). The first level consisted of removing several centimeters of loose sediments and sod from the surface. Bedrock was visible from the surface in the northeastern corner of the unit prior to excavation. This bedrock sloped southwest, and decomposing bedrock was encountered throughout the unit by the base of Level 2, Layer 2.

Table 11.5 Results of Test Unit 3, 5LA4854, PCMS.

Layer	Level	Depth (bgs)	Material Recovered
1	1	1 - 2 cm	No artifacts
2	1	10- 12 cm	No artifacts
2	2	18 - 26 cm	No artifacts

Stratigraphy. The north and south walls of Test Unit 3 were cleaned and profiled. Figure 11.7 is a profile drawing of the south wall. Two stratigraphic units were visible in the profile, and are described below.

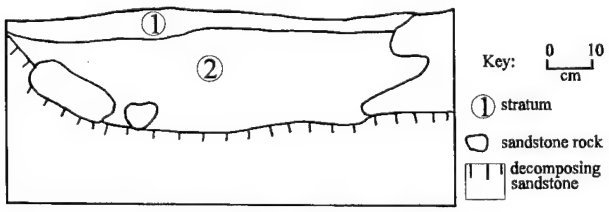

Figure 11.7 South wall profile, Test Unit 3, 5LA4854.

Stratum 1 is a dark, yellowish brown (10YR 4/4) sandy loam. This stratum has a loose to granular structure. Sandstone gravel were frequent in this sod (Soil "A") horizon developed in eolian and residual sediments. The stratum ranges in thickness between 2 cm and 6 cm. The lower boundary is gradual to abrupt.

Stratum 2 is a dark brown (10YR 4/3) silt loam with sand. The structure is massive to granular. Sandstone and caliche gravel dominate the stratum. This stratum represents the interface between a weak Soil "B" horizon and the "C" horizon. The stratum thickness varies between 11 cm and 22 cm. The lower boundary is abrupt where it overlies decomposing sandstone bedrock.

ANALYSIS AND INTERPRETATION

Excavations within Feature 1, a stone enclosure, recovered two artifacts: one chalcedony flake, and one hornfels directional core fragment. These two lithic artifacts were the only cultural material encountered during excavation.

A two liter flotation sample was taken from the same area where the core was uncovered. After processing the sample, the heavy and light fractions were analyzed. The heavy fraction contained only small pieces of sandstone and decomposing sandstone. A scan of the light fraction revealed only small rootlets.

Little can be stated in regard to the material culture present at this site other than that all lithic artifacts were made from locally obtained raw material types (Ahler 1992). A projectile point that was recovered during the survey is a side-notched point type dated to the Middle Ceramic Period and similar to those identified by Lintz and Anderson (1989). The association of the projectile point and Feature 1 is not certain. The point was located nearly 25 meters from the feature; however, it was the only artifact within roughly 50 meters of the feature. The age of the feature cannot be assumed to represent the same time period as that of the projectile point.

Excavation within Feature 1 indicated that if the stone alignment was cultural, it received marginal use, perhaps during a single episode of use. Feature 1 may have served as a hunting blind or simply as a temporary shelter from the elements. The location of the feature has two advantages. The hummock would have provided a good vantage point from which to observe the surrounding open plain. The two large boulders found on the north side of the feature would provide immediate shelter from the elements when there is little else in the surrounding landscape.

CONCLUSIONS

Site 5LA4854 consists of a single rock enclosure. The simple stone structure utilized the natural bedrock to form one end of the feature. The rocks that form the feature consist of a single layer of unshaped sandstone. One side-notched projectile point base was the only surface artifact identified with the site (Appendix IV).

Eligibility work at the site consisted of excavating five shovel tests and four test units. Two test units were placed across the enclosure; one unit was placed in the general vicinity of the projectile point base, and one unit was placed north of the stone structure in an area with sediment build-up. Two lithic artifacts were recovered within the stone enclosure. The remainder of subsurface excavations failed to produce any cultural materials or indication of a buried cultural horizon. The presence of the two artifacts from the enclosure indicates that the feature is probably of cultural origin, but the lack of an identifiable use surface and the relative paucity of material culture suggests that the feature was minimally utilized. Moreover, the likelihood that significant archaeological remains exist at the site is very low. Therefore, based on the results of eligibility testing and laboratory analysis, site 5LA4854 is not considered to be eligible for nomination to the National Register. Eligibility testing has exhausted the site's research potential, and no further archaeological work is recommended at this site.

CHAPTER 12

5LA5008

INTRODUCTION AND LOCATIONAL INFORMATION

Site evaluation for NRHP eligibility began at 5LA5008 on August 26 and was completed on September 12, 1994. A total of 17 person days were spent at the site. Work completed at the site consisted of EDM mapping, surface artifact identification, and the excavation of thirty-three shovel tests and six test units. Field and laboratory results have demonstrated that the site has the potential to yield significant information about the prehistoric lifeways of the inhabitants of the PCMS. In particular, the site has the potential to yield information about the economic use of the uplands portion of the study area. Therefore, it is recommended that the site be considered eligible for nomination to the NRHP under criterion D.

Figure 12.1 General site overview. View to the northwest.

Site 5LA5008 is a flaked and ground stone scatter located at the transition between the Hills and the Steppes Landscape Units (Figure 1.2) in a thick stand of junipers that surround open, grassy areas (Figure 12.1). The shallow ruts of an old road, possibly a stage route, run north to south through the site. The site is located along the crest of a low northeast to southwest trending ridge below a prominent mesa just north of the head of Bent Canyon (Figure 1.2). This mesa is part of the divide separating the Purgatoire River and Timpas Creek watersheds. The closest water source is an unnamed intermittent tributary to Bent Canyon located 600 m west of the site. The nearest permanent water source is a spring at Bent Canyon about 2.4 km south. Site locational data are presented in Table 1.1. Figure 12.2 is a site map depicting topographic detail, site boundaries, shovel tests, and excavations.

SITE SETTING

Geology

The underlying bedrock is the Upper Cretaceous Smoky Hill (limestone)

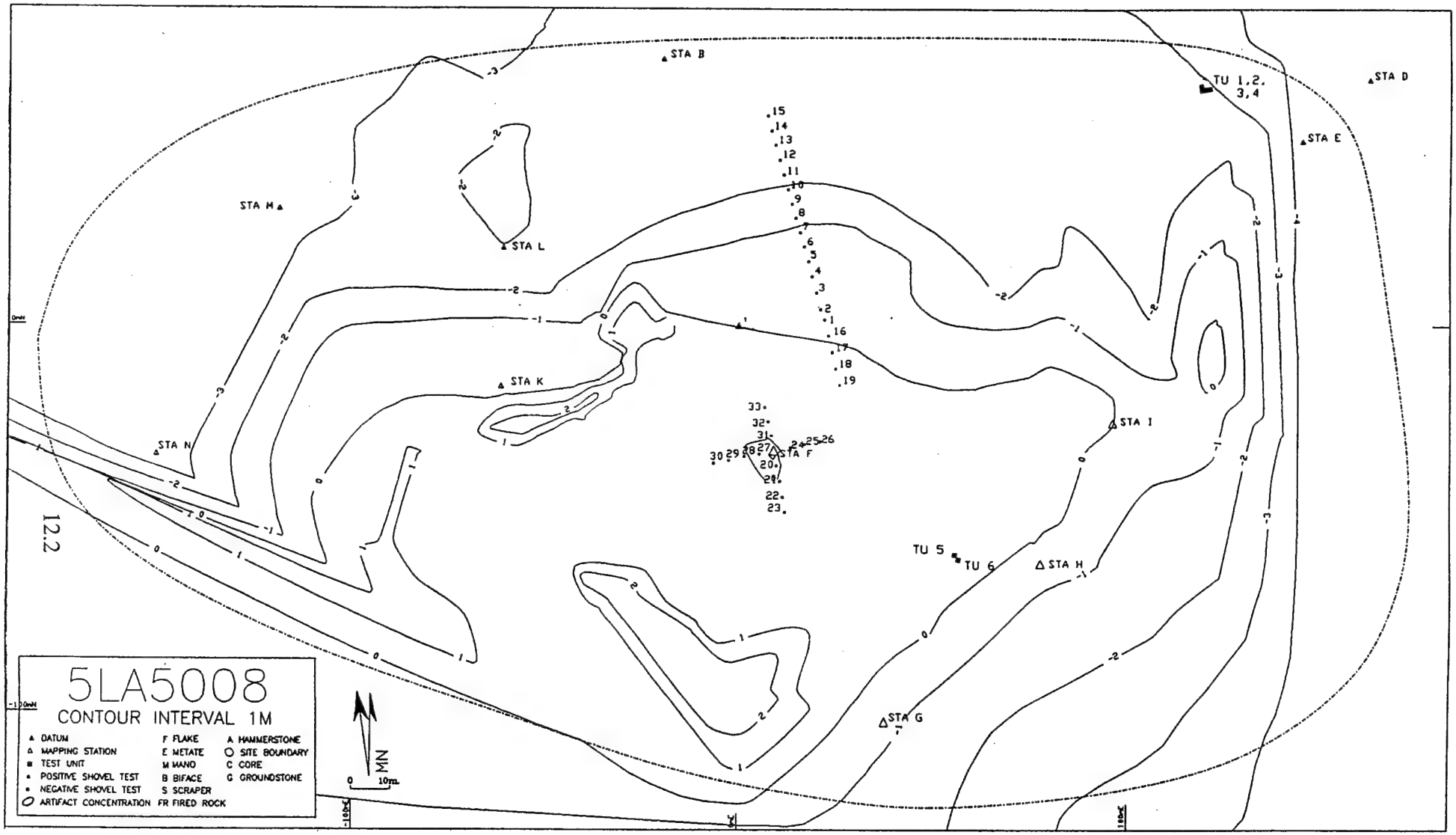

Figure 12.2 General site map, 5LA5008.

member of the Niobrara Formation. The limestone is a yellowish gray, fossiliferous, calcareous shale and silty limestone that erodes in step-like fashion with shallow depressions between the step-like ledges. Along the crest of the limestone are larger bowls that entrap sediments, particularly eolian sediments.

Soils

The soils are mapped as Penrose-Manzanola-Midway (U.S.S.C.S 1983). No real soil profile or regolith was observed in the profiles from the test units or from the shovel tests. The sediments at the site consist of silty, eolian sediments and residuum from the weathered limestone bedrock.

Vegetation

The site is located in the juniper woodlands, near the transition with the open grasslands. The junipers are relatively thick with a forb and grass understory. Areas of thick grasses grow within the bowl areas, presumably due to greater moisture retention in these low spots. Ancillary vegetation consists of sagebrush, yucca, cholla, prickly pear cactus, and occasional wildflowers.

PREVIOUS SURVEY RESULTS

This site was originally identified during the preliminary University of Denver survey, and later recorded by an archaeological crew from Larson-Tibesar Associates (Colorado State Site Form, 5LA5008). It was described as a very large but sparse scatter of lithic artifacts, one ceramic and one projectile point. Site size was presented as 280 m x 230 m on the original site form. The site was dated to the Early Ceramic Period based on the projectile point type and a single plain gray ceramic sherd. Site boundaries were defined based on the visual extent and distribution of artifacts and associated topographic features. The site was surface collected in 20 m long transects. Each transect was 2 m wide and spacing between the transects was 20 meters. Twenty-three lithic artifacts were collected, and this was estimated to be a 10 percent sample of the total artifact assemblage. Groundstone, including manos and slab metates, was identified during the survey by University of Denver. The crew from Larson-Tibesar noted that several groundstone items were observed while delineating site boundaries. Unfortunately, these items were outside the survey quadrants and were not collected or described.

The variety of lithic material types, along with a perceived patterning in artifact distribution (both density of material and types of raw materials), was viewed by the archaeologists as being significant to an overall understanding of prehistoric subsistence and settlement patterns within the PCMS. Although architecture and other features were not observed at the site, the site was recommended for testing based on the spatial patterning of materials, the potential for buried deposits along the gentle slopes to the north, and the presence of temporally diagnostic artifacts. Aside from laboratory analysis of previously collected artifacts, survey reporting, and site flagging, the site received no further archaeological work until the eligibility testing conducted by Fort Lewis College.

RESULTS OF ELIGIBILITY TESTING

Surface Reconnaissance

Surface reconnaissance at site 5LA5008 began with an informal pedestrian inventory of the area inside the designated flagging. The site proved to be a very large but sparse flaked and ground stone scatter. Although artifacts are dispersed in limited numbers across the site, distinct concentrations are present within the designated site boundary. The original PVC datum was relocated and designated the main site datum. Additional mapping stations were placed across the site to facilitate mapping of this very large site. The site was then systematically inventoried by walking in east-west transects across the site with spacing about 15 m apart. In this fashion, the entire site area was covered. Site boundaries were defined as the entire flagged area. The site boundary defined on the site form was very irregular and it was not possible to reestablish the original boundary from the ground. Due to the large site area and the difficulty of mapping artifacts through the juniper trees, artifacts were mapped in clusters. In addition to artifact clusters, all identified tools (flaked and ground stone) were mapped (Figure 12.4, Table 12.1). Artifacts from the surface included a variety of material types and several functional tool categories. No diagnostic artifacts were identified during this inventory. A sample of tool types and material types were collected for laboratory analysis, but field analysis of all surface artifacts was not conducted at the site; however, it is estimated that surface artifacts may total as many as 500 individual pieces.

A pair of possible wagon ruts run in a north to south line across the site. The ruts are most clearly visible just inside the site boundary in the southeast portion of the site (Figure 12.3).

Figure 12.3 Wagon ruts at 5LA5008. View to the northwest.

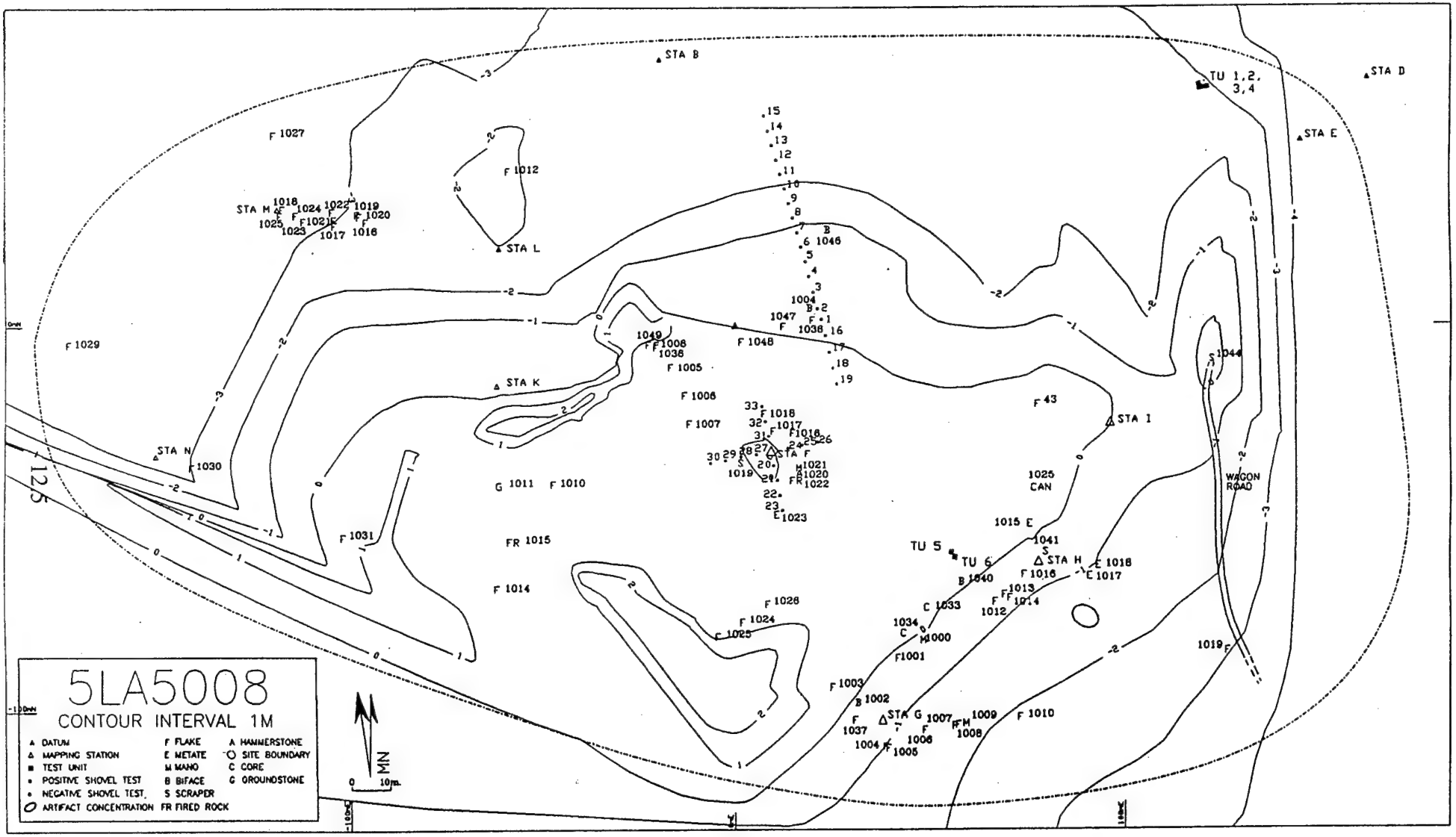

Figure 12.4 General site map with surface artifacts, 5LA5008.

Table 12.1 Surface artifacts, 5LA5008, PCMS.

Map No.	Artifact Type	Debitage Category	Material Type
*1004	Flake	Broken	Chert
*1007	Flake	Broken	Chert
*1017	Side Scraper	NA	Silicified Wood
*1019	Bimarginal Scraper	NA	Silicified Wood
*1020	Hammerstone	NA	Dakota Quartzite
*1021	Mano	NA	Mixed Quartzite
*1023	Side Scraper	NA	White Quartzite
*1033	Core Tool	NA	Dakota Quartzite
*1034	Rotated Core	NA	White Quartzite
*1037	Flaked Tool	NA	Mixed Quartzite
*1038	Flake	Broken	Chert
*1039	Flake	Complete	Chert
*1040	Biface	NA	Quartzite
*1041	Flaked Tool	NA	Argillite
*1043	Flaked Tool	NA	Dakota Quartzite
*1043	Side Scraper	NA	Hornfels
*1045	Flaked Tool	NA	Chert
*1046	Discoidal Bimarginal Scraper	NA	Chert
*1047	Flake	Broken	Chalcedony
*1048	Flake	Complete	Chert
*1049	Flaked Tool	NA	Chert

* Collected

This section of the trail/road has a mature juniper growing in the middle of the ruts. The maturity of the juniper implies a degree of antiquity to the feature. This particular section of ruts measures about 7.3 meters in length. The maximum width for both ruts is 3 meters across. Each rut is 90 - 110 cm across with a 30 - 50 cm ridge in the middle. It ends at a small stand of junipers where the ruts become part of a small arroyo. The section of road by the juniper has suffered less damage from erosion than the sections on either side because the trees impede the process of downcutting. Water collects in the cuts on the downslope side of the junipers and quickly forms small arroyos or gullies that continue to erode rapidly in the eolian and residual sediments. Historical references indicate that this set of ruts may be associated with the Bent Canyon Stage Route. The Bent Canyon Stage Stop is located south of the site along the banks of Bent Canyon (Friedman 1985). Bob Hill, a long time resident of this area of the PCMS, says it is probable that this section of ruts belongs to the stage coach road that entered the PCMS from Las Animas (Hill 1994, personal communication).

Subsurface Investigations

Subsurface testing at the site consisted of shovel testing and 1 m x 1 m excavation units. Thirty-three shovel tests were placed in two areas of the site. Fourteen of these were placed in Area 1 and the remaining 19 in Area 2. Test unit excavations consisted of six 1 m x 1 m units. The location of these tests are shown in Figure 12.2 and 12.4.

Shovel Tests Both areas chosen for shovel testing were in locales where sediment accumulation was believed to be the greatest. Area 1 was chosen because it was the location suggested in the original site form as having the greatest potential for buried deposits. Area 2 was selected because it was a grassy area along the crest of the ridge where sediment accumulations had collected in a low spot surrounded by juniper trees (Figure 12.1). Two perpendicular shovel test lines forming an "X" were placed in Area 1. The lines were oriented north to south and east to west. One north to south line of shovel tests was placed in Area 2. The shovel tests were placed at four meter intervals in each of the two designated areas. All shovel tests were excavated to bedrock or an indurated caliche layer. The shovel tests range in depth from 6 cm to 46 cm with an average depth of 24 cm. Flaked and ground stone artifacts encircled the periphery of the open area in Area 1 at the transition between the eolian sediments and the outcropping limestone. Shovel testing did not provide significant information on the subsurface potential of buried deposits (Table 12.2). However, the results from stratigraphic analysis showed that sediment accumulations within the grassy areas are greater than in the limestone steps, and that continued excavation in these areas may produce buried artifacts and features.

Test Unit Excavations Six test units were excavated at the site during this testing phase. Four of these units were positioned near the east edge of the site in one of the limestone steps. Two units were placed diagonally to each other where a partially buried metate and mano were visible from the surface. Two additional units, Test Units 3 and 4, connected Test Units 1 and 2 to complete a larger, "L" shaped excavation unit. Test Units 5 and 6 were placed in another step-like area, but in a location where surface artifacts were concentrated around several step-like areas. Results of the test unit excavations are presented in Table 12.3.

Table 12.2 Shovel tests results, 5LA5008, PCMS.

Shovel Test No.	Depth of Stratum (cm)	Stratum (N)	General Stratigraphic Description	Materials Recovered
1	10 29	1 2	Light brown loose silt light brown, compacted but friable silt loam to limestone bedrock	1 scraper 10-20 cm bgs
2	9 27	1 2	Light brown loose silt light brown silt loam with caliche to limestone bedrock	No artifacts
3	8 25	1 2	Same as Shovel Test 1	No artifacts
4	9 19	1 2	Same as Shovel Test 1	No artifacts
5	4 12	1 2	Light brown loose silt gravelly silt loam to limestone bedrock	No artifacts
6	11	1 2	Gravelly silt loam to weathered limestone bedrock	No artifacts
7	8 28	1 2	Gravelly silt loam compact silt loam with caliche	No artifacts
8	6 27	1 2	Same as Shovel Test 7	No artifacts
9	8 36	1 2	Light brown loose silt loam compact silt loam with caliche to limestone bedrock	No artifacts
10	6 28	1 2	Same as Shovel Test 7	No artifacts
11	7 20	1 2	Same as Shovel Test 9	No artifacts
12	5 18	1 2	Same as Shovel Test 9	No artifacts

Shovel Test No.	Depth of Stratum (cm)	Stratum (N)	General Stratigraphic Description	Materials Recovered
13	9 33	1 2	Same as Shovel Test 9	No artifacts
14	8 45	1 2	Same as Shovel Test 9	No artifacts
15	7 46	1 2	Same as Shovel Test 9	No artifacts
16	8 38	1 2	Same as Shovel Test 9	No artifacts
17	7 39	1 2	Same as Shovel Test 9	No artifacts
18	8 20	1 2	Same as Shovel Test 9	No artifacts
19	9 31	1 2	Same as Shovel Test 9	No artifacts
20	10 18	1 2	Pale brown (10YR 6/3) silt compact, pale brown silt to silt loam	No artifacts
21	11	1	Massive pale brown (10YR 6/3) silt to limestone bedrock	No artifacts
22	9	1	Same as Shovel Test 21	No artifacts
23	6	1	Same as Shovel Test 21	1 flaked lithic
24	10 40	1 2	Large tabular sandstone with fine, pale brown silt compact, pale brown silt with caliche to platy, weathered limestone bedrock	No artifacts
25	14 18	1 2	Pale brown, fine silt compact silt to silt loam with caliche to limestone bedrock	No artifacts
26	10 20	1 2	Same as Shovel Test 26	No artifacts

Shovel Test No.	Depth of Stratum (cm)	Stratum (N)	General Stratigraphic Description	Materials Recovered
27	8 23	1 2	Pale brown silt loam compact, granular silt loam with caliche (bioturbation)	No artifacts
28	8 25 30	1 2 3	Pale brown, fine, silt with gravel and pebble-size limestone granular silt with Fe oxide coatings to indurated caliche layer	No artifacts
29	15	1	Pale brown, silt to angular limestone bedrock	No artifacts
30	10 36	1 2	Possible soil horizon, pale brown silt to silt loam with blocky structure and caliche to limestone bedrock	Shattered chert
31	18	1	Pale brown silt to limestone bedrock	No artifacts
32	13	1	Same as Shovel Test 31	No artifacts
33	7	1	Silt to duff layer to outcropping weathered limestone bedrock	No artifacts

*Collected

Table 12.3 Test unit results, 5LA5008, PCMS.

Test Unit No.	Size (m)	Layers	Final Depth (bgs)	Materials Recovered
1	1 m x 1 m	2	10 - 18 cm	1 metate 1 lithic artifact
2	1 m x 1 m	1	2 - 5 cm	1 mano
3	1 m x 1 m	1	2 - 8 cm	1 lithic tool 1 lithic artifact
4	1 m x 1 m	1	6.5 - 9 cm	No artifacts
5	1 m x 1 m	1	5 - 9 cm	1 burned bone
6	1 m x 1 m	1	6.5 - 9 cm	Charcoal fragments

Test Unit 1 Test Unit 1 was placed over a partially buried metate. It was excavated by trowel in two strata. At the base of Stratum 1 was a compacted silt layer, and below this silty layer was decomposing bedrock. The metate was resting on the surface of the compacted stratum. A single lithic artifact was the only other artifact recovered from Stratum 1. No artifacts were recovered from Stratum 2.

Test Unit 2 Test Unit 2 was excavated diagonally from Test Unit 1. A mano was recovered from this test unit. This mano was resting on a very thin (1-2 cm) layer of silt just above decomposing limestone bedrock. A pollen sample was collected from beneath the mano. This was the only artifact recovered from this unit.

Test Unit 3 This test unit was placed adjacent to both Test Unit 1 and Test Unit 2 (Figure 12.5). It was excavated in one layer to limestone bedrock. The purpose of this unit was to determine the depth of the limestone bedrock pavement. A very thin layer of eolian, sandy silt overlies the fractured limestone bedrock. One quartzite tool fragment and one banded chert flake were point provenienced in the unit. Both artifacts were located at the interface between the limestone bedrock and the eolian sediments.

Test Unit 4 Test Unit 4 was placed adjacent to Test Unit 2 to the north. This completed an "L" shaped larger unit. This unit was also excavated in one layer to the decomposing limestone. No artifacts were encountered in this unit, and no cultural surface was indicated.

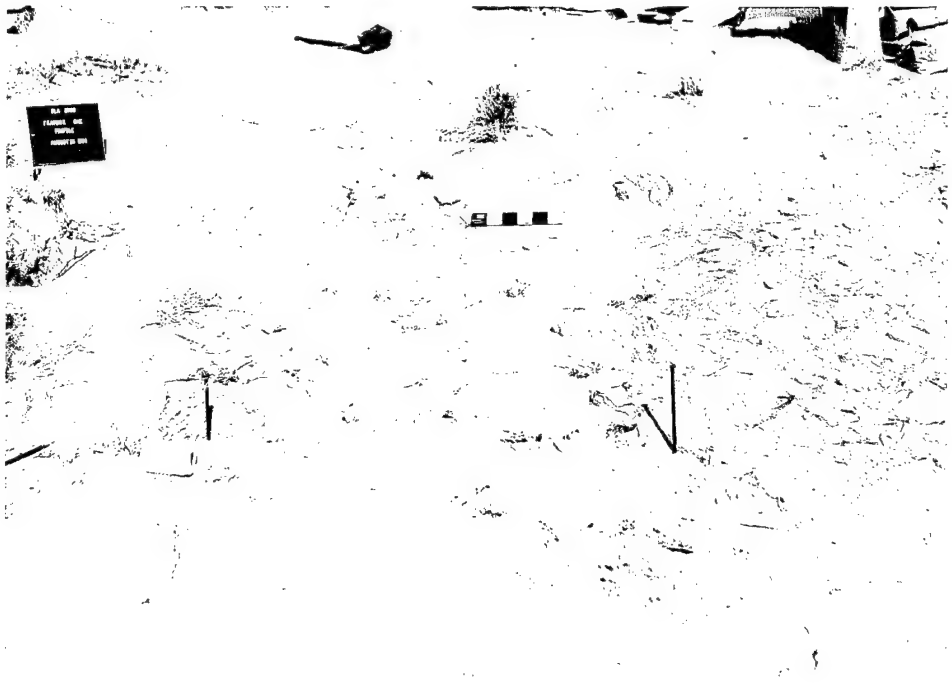

Figure 12.5 Test Units 2 and 3 at completion of excavation, 5LA5008.

Stratigraphy Two profile drawings were completed of the four units; a three meter long profile including the east walls of Test Units 2, 3, and 4 and a north wall profile of Test Unit 4, which was also photographed. Three strata were identified in the east wall (Figure 12.6), and they are described below.

Stratum 1 is a light, brownish gray (2.5Y 6/2) fine, silty sand, massive with no soil structure. Angular limestone and weathered shale are frequent. There is a heavy reaction with hydrochloric acid. This stratum is primarily residual sediments from the weathered limestone with some eolian sediments. The lower boundary is abrupt to sharp. Artifacts were recovered from this stratum.

Stratum 2 is a pale brown to light, brownish gray (10YR 6/3 to 2.5Y 6/2) massive, fine, silty sand composed of residual and eolian sediments. A few angular to platy limestone inclusions are present. Reaction with hydrochloric acid was heavy. Artifacts were recovered from the interface with Stratum 3. The lower boundary is sharp.

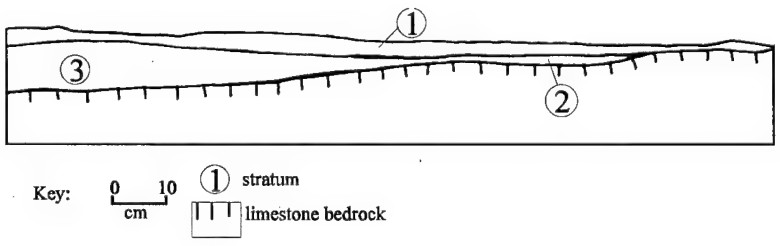

Figure 12.6 East wall profile, Test Units 1 and 3, 5LA5008.

Stratum 3 is a light, brownish gray (2.5Y 6/2) platy weathered limestone and shale. The lower boundary is gradual with massive limestone bedrock. No artifacts were recovered from the stratum. It is the top of the "C" horizon.

The test units were all excavated with the contour of the ground surface, and in stratigraphic layers. The mano was resting on a thin (<1 cm) layer of eolian silt above the limestone pavement. The metate, further inward in the limestone step, was buried slightly more deeply and rested on a more compacted, natural surface. This surface is perhaps a result of calcium carbonate (caliche) accumulations. This compacted surface was not continuous throughout the unit. Where it was present, it was at the same stratigraphic break as the eroding limestone. A utilized flake and a piece of lithic debitage were resting on the limestone pavement and buried beneath 1 - 2 cm of silt.

Test Units 5 and 6 Test Unit 5 and Test Unit 6 were located in another limestone step where a surface artifact concentration was identified. The two test units were placed diagonally to each other (Figure 12.7). They were excavated in a single layer to the compacted surface previously identified in Test Unit 1. A small piece of burned bone from Test Unit 5 and three pieces of charcoal from Test Unit 6 were the only materials recovered from the excavations. These two units were excavated to compare the stratigraphy between the two limestone steps and to test for buried artifacts.

Stratigraphy The stratigraphy of these two units was identical to Stratum 1 and Stratum 2 from the previous units, and the reader is referred to these stratigraphic descriptions. The strata were described and photographed.

Figure 12.7 Test Unit 5 and Test Unit 6. View to the northwest.

ANALYSIS AND INTERPRETATION

The collected artifact assemblage from this site is limited to a battered quartzite cobble, a sample of flaked lithic tools, and a sample of lithic material types from the surface along with three subsurface flakes, three subsurface lithic tools (one biface fragment, one complete biface, and one retouched flake) , a subsurface mano, and a subsurface metate. The range and diversity of tool types at this site are impressive. However, only one projectile point has yet been found; this was collected by the Larson-Tibesar survey crew . This projectile point is broken at the base (Appendix IV). It is a medium to large, triangular point with corner-notches, manufactured from a light-brown chert. The point is similar to Late Archaic and Early Ceramic Period points described by Lintz and Anderson (1989). A very small, gray ceramic was collected from the north end of the site during the initial inventory.

Eighteen lithic tools were analyzed in the laboratory. Eleven of these were manufactured from quartzite, and three were manufactured from local chert. The remaining four artifacts were manufactured from silicified wood (2), argillite (1), and hornfels (1). Six of the tools are described as flaked tools due to their fragmentary state. Three side scrapers were identified and are made from three different material types (silicified wood, quartzite, and hornfels). Five bifaces comprise the remainder of the lithic tool assemblage. Two of these represent broken quartzite biface tips. The larger of the two tips may represent part of a knife-like tool, while the smaller tip may have been part of a projectile point. The remaining bifaces consist of two quartzite discoidals and one silicified wood bifacial scraping tool. Other tools consists of a quartzite core tool, a rotated quartzite core, and two hammerstones. One of the hammerstones is manufactured from sandstone. This tool measures 8.5 cm long, 5.5 cm wide, and 5.4 cm thick and exhibits battering on both ends. The other hammerstone is made from a quartzite, river-transported cobble. The cobble, an obvious manuport, exhibits slight battering along one end. It measures 13.6 cm long, 6.5 cm wide, and 4.2 cm thick.

All scrapers showed characteristics of transverse motion. Both the core tool and the rotated core were used in a longitudinal manner. The large knife-like biface tip showed signs of both longitudinal and transverse wear. The hammerstones exhibited no evidence of modification other than those created through use wear. With the exception of the projectile point tip, the tools appear to have been used for processing activities.

Two groundstone artifacts were discovered during excavation. The subsurface groundstone includes a mano fragment and a metate fragment; both were manufactured from sandstone, presumably from Dakota Sandstone. These two artifacts were located in adjacent test units, and they appear to have been resting on the occupation surface. The mano fragment exhibits pecking on at least one lateral surface as well as on one lateral edge. The metate fragment looks to be about half of its original size. It is utilized on one surface. Pecking and grinding appear on the utilized surface. Longitudinal striations are present near the center. Although incomplete the metate measures 20 cm long, 17 cm wide, and 6.5 cm thick.

The mano and metate recovered from subsurface excavation along with a control sample was submitted for pollen identification. Pollen washes were completed on the two groundstone pieces. The results of this analysis show that the two washes contain significantly greater juniper percentages than the control sample and lesser amounts of Cheno-*Am* (Saltbush, Goosefoot, Pigweed, and Others) and Other Compositae pollen [(Rabbitbrush, Snakeweed, Sunflower, and Others) Appendix II]. Three explanations for the higher percentage of juniper pollen from the pollen washes are possible. The first, and most obvious, is that at the time the mano and metate were deposited juniper trees were more common locally than they are today. Secondly, the groundstone was in use during the season when juniper trees are pollinating. Third, the high juniper pollen may represent processing of juniper berries. The last explanation is the least likely since juniper berries occur after the pollen season. That junipers were more dominant at the site during this period in prehistory is perhaps the most probable of the three explanations; however, the site is currently located in a thick juniper forest. The season of use of the mano and metate is inferred as other than summer, because the light limestone bedrock absorbs and reflects the sun, and for much of the year the site is practically unbearable. A late winter and early spring occupation would have been preferred over summer or even early fall at this location.

Sediments at 5LA5008 are an accumulation of eolian sediments and residual sediments from the weathered limestone and shale bedrock. Sediments at the site are shallow with little evidence for soil formation. The present flora are limited primarily to juniper and grasses. Short to tall grasses grow in isolated clumps in the open areas surrounded by junipers. It is in these open areas that there is limited evidence of active pedogenesis.

Although a buried cultural horizon was not identified in either the test unit excavations or the shovel tests, a prehistoric use surface exists at the site. This use surface is identified as the surface upon which the artifacts are presently resting. Over the course of prehistory, the shallow depressions have both collected sediments and undoubtedly have lost sediments through wind erosion. Artifacts, whether exposed on the bedrock or in the shallow depression under a thin layer of sediments, possess contextual integrity. Artifacts have not migrated any great distance, if any, from their original point of deposition; furthermore, activity loci are present at the site either along the present ground surface or buried beneath shallow sediments in the steps and possibly in the grassy, open areas along the crest of the ridge.

CONCLUSIONS

The eligibility testing at 5LA5008 included surface mapping, and the excavation of 33 shovel tests and 6 test units. Additionally, a sample of surface tool types was collected for laboratory analysis. The results of this investigative work show that although a buried cultural horizon was not clearly delineated, in fact a habitation surface is present at this site on the bedrock. Buried artifacts, however, occur within the limestone steps and in the open, grassy areas. The diversity of lithic tools and lithic material types suggests that a broad range of activities were conducted here. Groundstone implies plant or animal processing, as do the majority of lithic tools from the site. The site shows little evidence for core reduction, and the range in material types, many of which can not be acquired from the general vicinity, shows that tools or tool preforms were being brought to the site for reduction and use. A single projectile

point implies that hunting may have been conducted at the site. The time period is uncertain but the projectile point may date to the Late Archaic Period. The ceramic is very small and not diagnostic, but may date to the Early Ceramic Period.

Because the limestone surface can be easily followed in many places and because it is this surface on which the artifacts were originally deposited, the entire limestone bedrock represents an occupation surface. There is a possibility of studying individual activity areas at this site - almost from the existing surface with little need for excavation. This site has the potential to provide significant information on the prehistoric use of the upland environments, on seasonality and settlement patterns, and on lithic tool manufacturing processes. It is recommended that the site be considered eligible for nomination to the NRHP under Criterion D.

CHAPTER 13

5LA5360

INTRODUCTION AND LOCATIONAL INFORMATION

Site evaluation for NRHP eligibility was conducted by Fort Lewis College at 5LA5360 from September 12 -14, 1994. A total of 12 person days were spent at the site. Archaeological investigation at the site consisted of EDM mapping, surface artifact identification, field analysis of surface artifacts, and the excavation of four test units. The results of field and laboratory investigations and historical literature review have demonstrated that the site has the potential to yield significant information under Criterion D, and that both the prehistoric and historic site components are considered eligible for nomination to the NRHP.

Site 5LA5360 is a large, multiple component historic and prehistoric site that is located above the canyon rim southwest of Taylor Arroyo. It is situated in a sparsely vegetated, open area at the transition between the Steppe an Canyon/Arroyo Landscape Units (Schuldenrein et al 1985: Figure 1.2). The most evident component at the site is an 1860s to 1870s historic homestead (Figure 13.1). The walls of two sandstone structures remain standing while a third structure of dry-laid sandstone is concealed by riparian vegetation in a small drainage. This

Figure 13.1 General site overview, 5LA5360. View to the northeast.

drainage is formed by the funneling of surface water from a sandstone slickrock area combined with ground water that emerges from a spring. A dense scatter of historic debris surrounds the structures and thins as distance from the structures increases. The prehistoric component consists of a widely scattered flaked lithic and ground stone scatter. Bedrock rock mortars and possible simple stone features such as rock alignments are present as well. The historic structures are situated at about the highest relief with a gentle slope to the northeast and east to the edge of Taylor Arroyo. Aspect at the site is open. Locational data are provided in Table 1.1. Figure 13.2 is a map of the site showing site boundaries, archaeological features, subsurface test units, and topographic detail.

SITE SETTING

Geology

Bedrock geology is representative of the Lower Cretaceous Dakota Sandstone Formation, a yellowish brown, crossbedded cliff-forming sandstone. Bedrock is shallow across the site with many visible exposures. The sandstone outcrops north and northeast of the site where it forms a broad but shallow drainage. The rock outcrops in the form of small ledges that erode easily to form rounded slickrock. Surface water collects in several shallow pools along the slickrock. North of the site, the slickrock drops suddenly into a steeper drainage where a small spring rises to the surface. The spring is probably the result of water forced to the surface through contact with a more resistant lithostratigraphic unit. Taylor Arroyo, to the east cuts into Lower Cretaceous age Dakota Sandstone and Purgatoire Formation.

Soils

The soil mapped by the U.S.S.C.S. (1983) for this site area is the Travessilla-Wiley-Villagreen. The soils area developed in residual and eolian deposits. The soil profile at the site consists of a very thin soil "A" horizon overlying a weak Soil "B" horizon that rests on sandstone bedrock. These sediments exhibit relatively high calcium carbonate content with an abundance of sandstone and caliche gravel.

Vegetation

Vegetation at the site is primarily short grasses with occasional juniper trees. The site is located at the transition between the open grassland and the riparian canyon bottom vegetation. A small drainage with a dense thicket of aspen, feather junipers, and deciduous shrubs is present northwest of the main site area. Other observed vegetation includes cholla, yucca, prickly pear cactus, red three-awn grass, skunkbrush, blue gramma grass, sunflower, foxtail grass, glove mallow, cheatgrass, blackfoot daisy and plantago.

PREVIOUS SURVEY RESULTS

This site was first identified during the inventory of the high site probability sections of Area C (Pozorski and Guthrie 1984). It was recorded by archaeologists from the University of

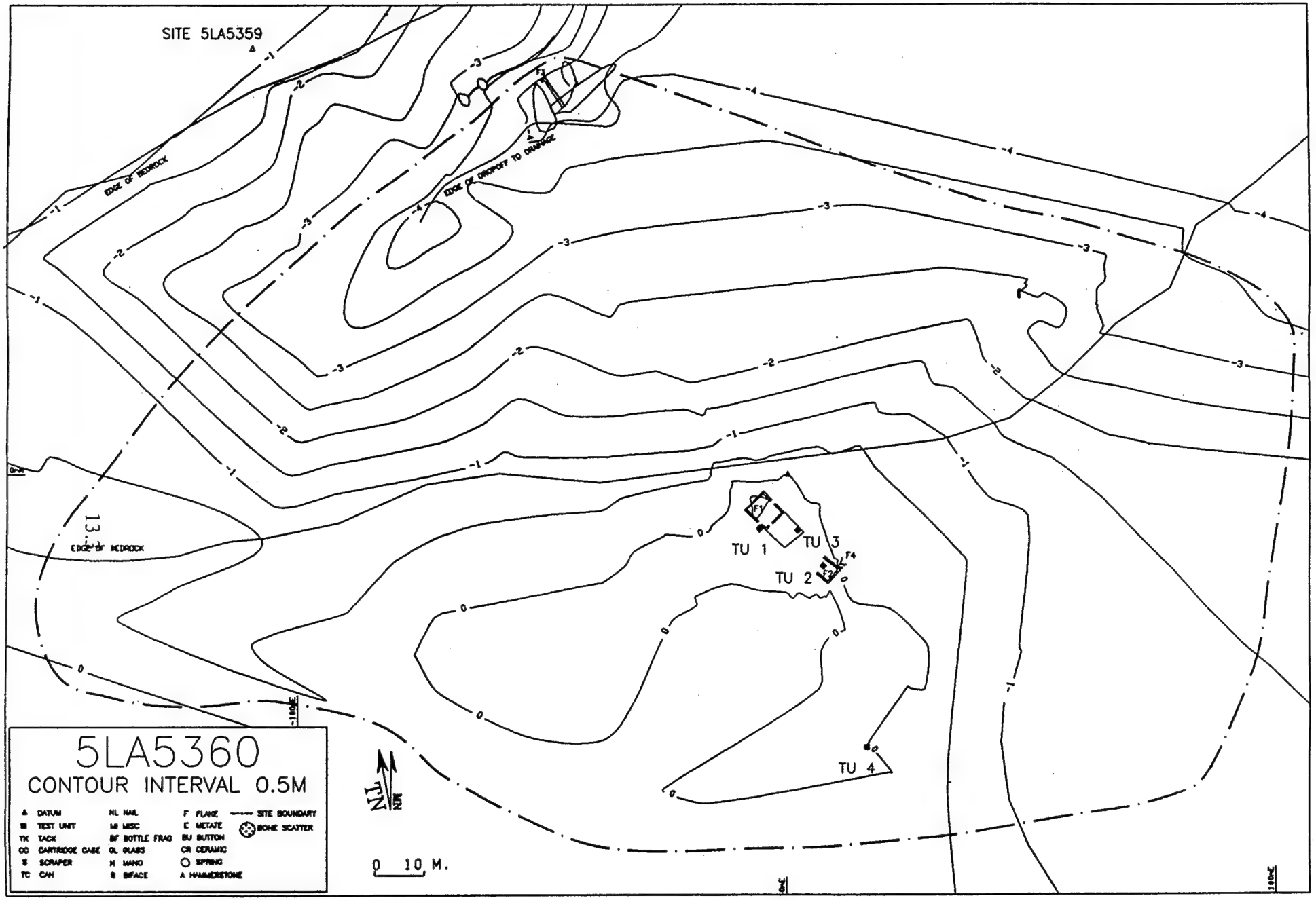

Figure 13.2 General site map, 5LA5360.

Denver in June, 1983 (Colorado State Site Form, 5LA5360). The site was described as a multiple component site with a prehistoric lithic and ground stone scatter and an early historic homestead. Three historic structures and a wide scatter of historic artifacts were mapped at the site. Because the site held the potential to yield significant information under Criterion a- Early Settlement and Exploration, and under Criterion D - Archaeological Potential - the site was recommended as eligible. At that time, no mention was made to the eligibility status of the prehistoric component. Reevaluation of the prehistoric archaeological component was the focus of a second inventory conducted in 1987 by archaeologists from Larson-Tibesar Associates (Colorado State Reevaluation Form, 5LA5360). This visit provided a more substantial map of the prehistoric component as well as remapping the historic structures. In addition to the flaked lithic and ground stone scatter noted during the initial inventory, the reevaluation succeeded in identifying nine bedrock metates on the slickrock, a hearth, a stone circle and a sandstone wall. The results of this reevaluation recommended that both historic and prehistoric components be considered eligible for nomination to the National Register of Historic Places. Aside from the initial recording, the reevaluation inventory, archival research (Friedman 1985), laboratory analysis of collected artifacts (Carrillo 1989), and report documentation, the site received no further archaeological work until the eligibility testing performed by Fort Lewis College.

RESULTS OF ELIGIBILITY TESTING

Site investigations included surface artifact analysis and mapping, feature mapping and subsurface test excavations.

Surface Reconnaissance

The original site datum was relocated, and surface investigations began with a pedestrian survey of the site area. The three historic structures were relocated, mapped and described and a fourth historic feature was identified and mapped. The historic artifact scatter and prehistoric artifact scatter were mapped, and a sample of the artifacts were mapped in place and described (Figure 13.3 and Table 13.1). A sample of diagnostic historic artifacts were collected for further analysis as were two obsidian flakes.

The prehistoric component consists of a large and diffuse scatter of flaked lithic and groundstone artifacts. A few possible bedrock mortars were observed on the slickrock. The prehistoric artifact scattered continued for an undetermined distance away from the site in all directions making it difficult to accurately define the parameters of the scatter; however, it was necessary to impose limits on the scatter. This was accomplished by using the natural topography and the limits of the more dense scatter as site boundaries. To the north and east, site boundaries were the northern edge of the slickrock and the edge of the steppe respectively. Site boundaries to the south and west were defined based upon our best judgement of what constituted a demarcation between this site and the next scatter. Realistically, this site is probably one of many scatters that comprised a entire set of prehistoric activity areas. Just to the north across the slickrock is site 5LA5359, a lithic scatter with several stone enclosures. Site boundaries between these two sites are conterminous.

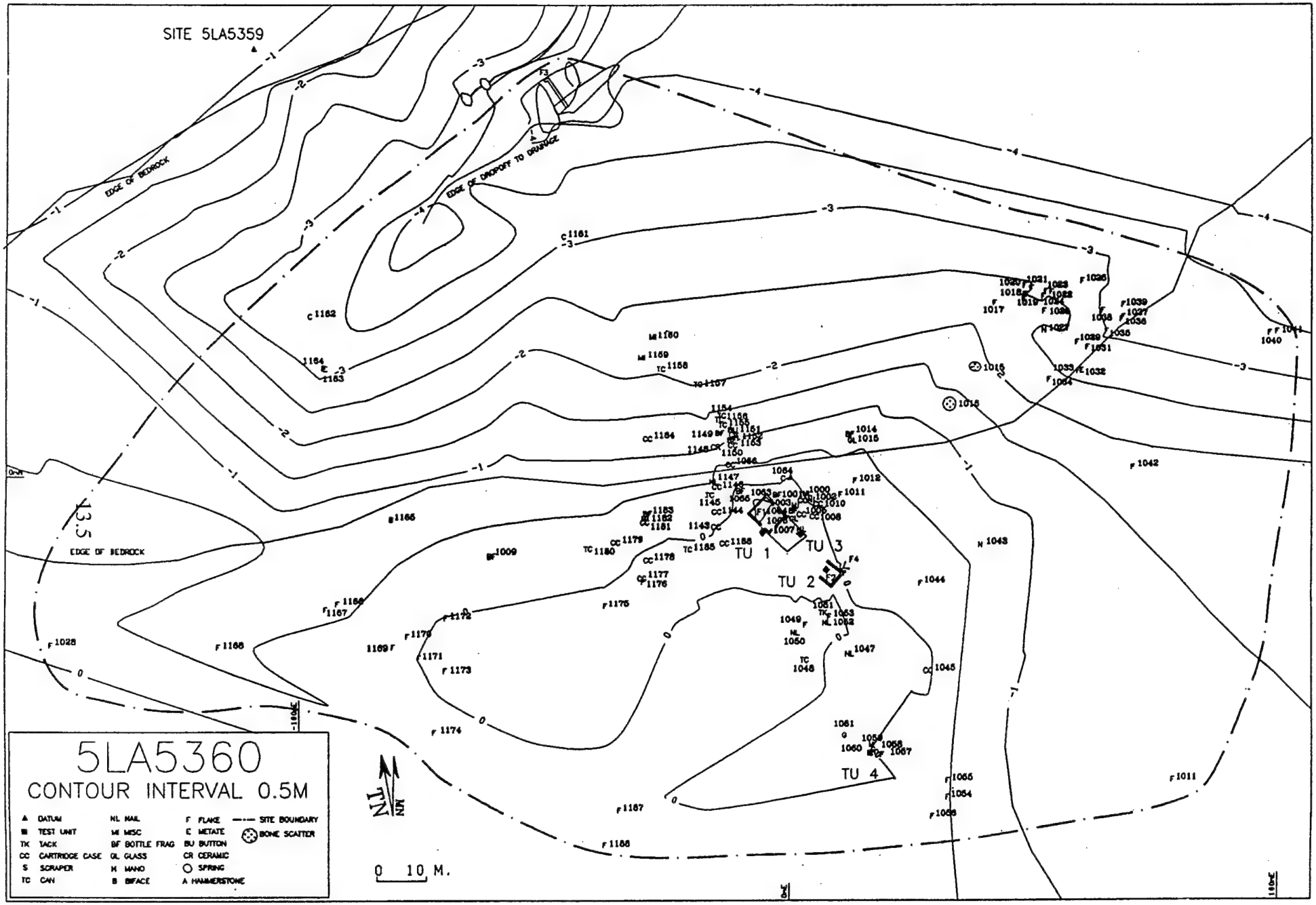

Figure 13.3 Generalized site map with surface artifacs, 5LA5360.

Table 13.1 Surface artifacts from prehistoric component, 5LA5360, PCMS.

Map Number	Artifact Type	Debitage Category	Material Type
1011	Debris	Debris	Silicified Wood
1012	Debris	Debris	Quartzite
1017	Flake	Fragment	Quartzite
1018	Flake	Broken	Chert
1019	Flake	Fragment	Chert
1020	Flake	Fragment	Chert
1021	Flake	Fragment	Chert
1022	Flake Flake	Broken Fragment	Chert Chert
1023	Flake	Fragment	Chert
1024	Flake	Fragment	Chert
1025	Debris	Debris	Quartzite
1026	Flake	Fragment	Quartzite
*1027	Uniface	NA	Quartzite
1028	Debris	Debris	Quartzite
1029	Debris	Debris	Quartzite
1030	Metate Fragment	NA	Sandstone
1031	Flake	Broken	Quartzite
1032	Metate Fragment	NA	Sandstone
*1033	Flake	Fragment	Obsidian
1034	Flake Flake	Fragment Fragment	Chert Chert
1035	Flake	Broken	Quartzite
1036	Flake	Fragment	Argillite
1037	Core Fragment	NA	Argillite
*1038	Flake	Uniface	Obsidian
1039	Flake Flake	Complete Fragment	Basalt Chert
1040	Flake	Complete	Argillite

Map Number	Artifact Type	Debitage Category	Material Type
1041	Flake	Fragment	Chert
1042	Flake	Broken	Quartzite
1043	Scraper	NA	Chert
1044	Debris	Debris	Argillite
1050	Flake	Fragment	Quartzite
1053	Debris	Debris	Argillite
1054	Flake	Fragment	Chert
1055	Flake	Complete	Argillite
1056	Flake	Fragment	Obsidian
1057	Flake	Fragment	Quartzite
1058	Groundstone	NA	Sandstone
1059	Metate Fragment	NA	Sandstone
1060	Groundstone	NA	Quartzite
1061	Groundstone	NA	Sandstone
1064	Core Tool	NA	Argillite
1161	Core Tool	NA	Argillite
1162	Debris Uniface Mano	Debris NA NA	Basalt Chert Quartzite
1163	Metate Fragment	NA	Sandstone
1164	Core Mano	NA NA	Basalt Sandstone
1165	Biface Fragment	NA	Chert
1166	Flake	Fragment	Obsidian
1167	Flake	Fragment	Obsidian
1168	Flake	Broken	Quartzite
1169	Flake	Fragment	Argillite
1170	Flake	Complete	Argillite
1171	Debris	Debris	Basalt
1172	Debris	Debris	Chert

Map Number	Artifact Type	Debitage Category	Material Type
1173	Flake	Fragment	Argillite
1174	Debris	Debris	Quartzite
1175	Flake	Broken	Quartzite
1176	Flake	Broken	Chert
1187	Debris Debris	Debris Debris	Argillite Argillite
1188	Flake	Fragment	Argillite

* Collected

Table 13.2 Surface artifacts from historic component, 5LA5360, PCMS.

Map Number	Artifact Type	Description
1000	Nail	Square cut, 2 inch
1001	Cartridge Case	.45 centerfire
1002	Nail Glass	Square cut, 3 inch 2 pieces
1003	Strap metal	Miscellaneous
1004	Bottle glass	Owens, aqua
1005	Cartridge case	.45 centerfire
1006	Glass	Window
1007	Nail	Square cut
1008	Cartridge case	.50 Rimfire
1009	Bottle base	Sunbleached amethyst
1010	Cartridge case	.22 rimfire
1013	Glass scatter	5 m x 2 m brown and amethyst
1014	Nail Bottle glass	Square cut Brown, brandy finish
1015	Bone scatter	Burned and unburned
1016	Bone scatter	3 m x 3 m burned and unburned
1045	Cartridge case	.44 UMC, CFW, centerfire
1046	Staple	"U" fence staple
1047	Nail	Square cut
1048	Can top	Hole-in-top
1049	Nails	Wire drawn
1051	Buckle	1 1/2 x 1 1/2 inch
1052	Nails	Square cut and wire drawn
1062	Nails	Square cut
1063	Bottle glass	Hand applied, strap finish, aqua
1065	Bottle glass	Sun bleached amethyst, bottle base, round with off set circular depression, early bottling machine
1066	Cartridge case	.45 Colt, UMC
1143	Cartridge case	.45 Colt, UMC

Map Number	Artifact Type	Description
1144	Cartridge case	.45 Colt, UMC
1145	Lid	Shaker
1146	Cartridge case	.45
1147	Spike	Square cut, 3 1/2 inch
1148	Crockery	Scatter of brown crockery, 1.5 m x 1.5 m
1149	Bottle glass	Bottle base, amethyst, P
1150	Cartridge case Shotgun Case	.45 Colt, US #10 Shot, WRA
1151	Button	Bachelor
1152	Cartridge case Nail Bone	.45 Colt, US Square cut Scatter, unburned and burned
1153	Bottle glass	Strap finish, amethyst, condiment
1154	Crockery Can top	Brown Hole-in-top, bayonet opened
1155	Can	Hole-in-top
1156	Can lid	Friction lid
1157	Can	Hole-in-top, knife opened
1158	Can lid	Lard
1159	Metal	Decorative, upholstery button?
1160	Metal	Stove part
1177	Cartridge case	.30 WRA Co., WCP, centerfire
1178	Cartridge case Cartridge case	.40-32, WMC, S H .45 Colt, WRA Co.
1179	Cartridge case	.30 WFC, WRA Co., rimfire
1180	Can	Undetermined
1181	Cartridge case	.45, WRA Co., centerfire
1182	Metal	Arrow loop
1183	Bottle glass	Hand applied, brandy finish, brown
1184	Cartridge case	.45 Colt, US, centerfire
1185	Can	Hole-in-top
1186	Cartridge case	.45 Colt, UMC, centerfire

At the time of eligibility testing, it was not known that 5LA5360 had been re-evaluated since the original recording; therefore, pertinent information concerning the prehistoric component was not utilized by FLC while in the field. The result of this oversight is that the prehistoric component at this site was under emphasized at the expense of the historic component.

The historic component of the site includes the remains of three sandstone structures and a newly identified linear rock feature of unknown function. A broad historic artifact (trash) scatter extends for a large distance away from the structures. Historical documentation shows that the homestead was patented by a Mosby Lee, veteran of the Civil War, and later sold to John Taylor around 1890 (Friedman 1985). The three stone structures are constructed of crudely shaped sandstone slabs. Complete descriptions of these structures are provided below.

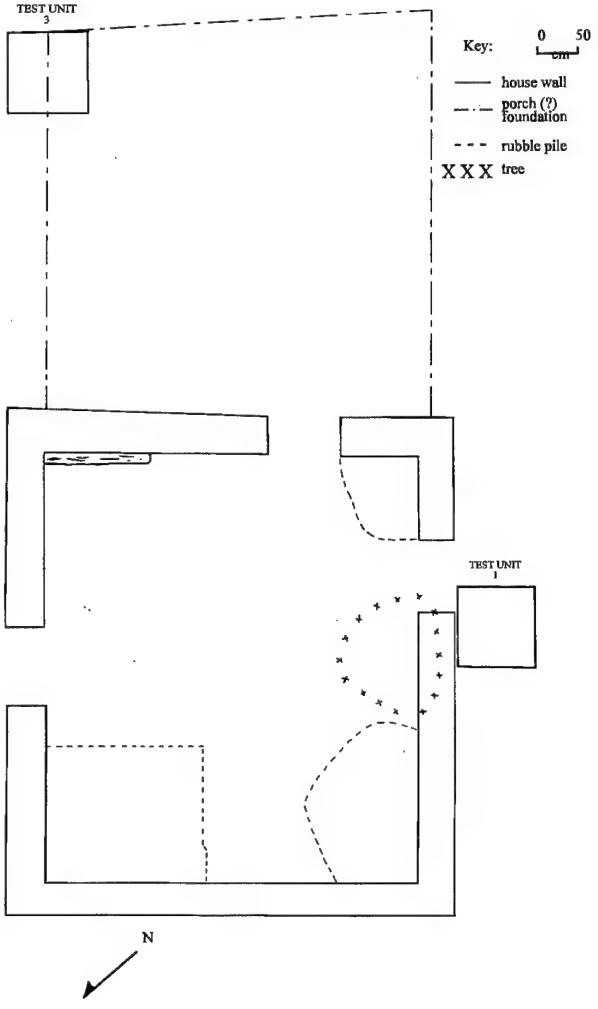

Figure 13.4 Feature 1, plan view, 5LA5360.

Feature 1 is the largest of the three structures and was the primary habitation unit. The outside dimensions are 19.75 ft by 18 ft. It is constructed entirely of tabular, native sandstone. A single window opens to the northeast, and two doors face to the southwest and southeast (Figure 13.4). The southeast wall, the tallest remaining of the four, contains about 20 courses of sandstone and is 6.5 ft high. The average rock size ranges from about 20 to 24 in long by 8 in wide and 4 in tall. One very large piece of sandstone (47 in x 8 in x 8 in) forms the top of the window sill. The walls average about 1.5 ft thick and possess an inner core of rubble and mortar (Figure 13.5). Some mortar and chinking stones are still visible in the walls. The corners are joined as opposed to abutted. A pile of rubble in the northeast corner of the structure may represent the remains of a collapsed fireplace. A low sandstone wall abuts the outside of the southwest corner of the structure. A single course of sandstone is all that is visible from the surface. This low sandstone wall continues to the south and turns to the west, and back to the north where it continues until it abuts the outside southwest corner of the habitation structure. It measures approximately the

same size as the habitation structure. It is postulated that the enclosure served as a porch or perhaps an outside summer kitchen.

Figure 13.5 Rubble core, Feature 1, 5LA5360.

Feature 2 is located about 26 ft to the southwest of the "porch" area of Feature 1. Feature 2 is a three-sided tabular sandstone structure that measures 12 ft x 16 ft (Figure 13.6). It is constructed of dry-laid masonry with little or no shaping of the sandstone. The walls are reduced to rubble (Figure 13.7). There is no remaining evidence that this feature ever possessed a fourth stone wall; perhaps it contained a wooden door or gate or may have always been open.

Feature 3 is a dry-laid sandstone structure that is located adjacent to the small spring northwest of Feature 1 just over the edge of the sandstone outcrop on the east side of the small drainage. The structure measures almost 16.5 ft long and almost 9 ft wide. Standing walls averaging 11 courses are about 3.5 ft high. There is no evidence for additional rubble or of a roof of any kind; therefore it is assumed that this feature retains most of its original shape and height. The back of the structure is built against the outcropping sandstone which formes the southwest wall, while the northeast wall is built even with the top of the sandstone outcropping (Figure 13.8). The interior may have been dug out. It is postulated that this feature served as a root

cellar for perishable food storage. Between the spring and the structure is a grove of aspen and some very

ge juniper trees. These tress provide a good deal of shade that in turn reduces the degree of transevaporation and keeps temperatures cooler than the surrounding site area.

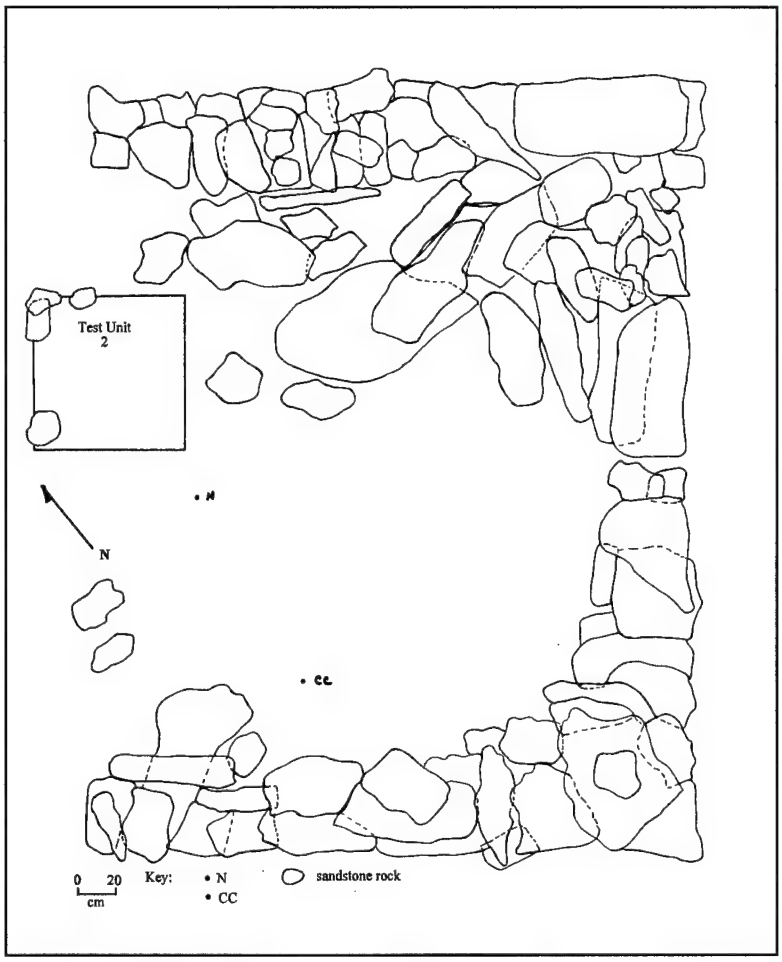

Figure 13.6 Feature 2, structure, 5LA5360.

Feature 4 is an "L" shaped rock alignment about 3 ft west of the southwest corner of Feature 2. It measures between 4 ft north and south by 5 ft east and west. The feature is characterized by a single course of sandstone rock that runs beneath a large bush. The function or purpose of this feature is not known. The original site form referred to a possible connection between this site and the old stage line. This inference was in part due to the presence of an old road located meters southeast of the site near the confluence of an unnamed drainage and Taylor Arroyo. This road was revisited by FLC (Figure 13.9). The road beginning at the bottom of the canyon is clearly visible; however, once the road ascends the canyon, it is no longer visible from the ground surface. The grade is steep here, and the sandstone canyon walls made construction difficult. The manpower behind the construction of the road is impressive. Both forks could be followed for short distances, but eventually both forks dissipate until they are no longer recognizable from the ground surface. The road was located on the topographic map and it was photographed. Although it may be directly related to the historic site, this was not confirmed either through ground truthing or from available literature. The function of the road also remains unknown. The road leads down a steep canyon into a tributary of Taylor Arroyo that end in a box canyon. Near the junction of the two drainages, massive rock block slides have dammed the small tributary and created deep pools. It is possible that these pools may have served as watering holes for either the historic homestead or for the stage line. A small dry-laid stone wall is built

Figure 13.7 View of Feature 2, 5LA5360. View to the southeast.

Figure 13.8 Feature 3, stacked stone storage feature, 5LA5360. View to the souteast.

Figure 13.9 Historic road southeast of site 5LA5360. View to the northeast.

upon a large sandstone boulder at the bottom of the small canyon. The origin and purpose of this wall are not known, but it is likely that the wall was constructed historically. The box canyon could be easily closed off at the junction with Taylor Arroyo forming a natural corral.

Subsurface Testing

Subsurface testing at this site consisted solely of four 1 m x 1 m test units. Three of the four test units excavated were placed within and adjacent to the historic structures and one was placed in an open area where prehistoric groundstone artifacts were found lying on the surface. Table 13.3 provides pertinent data on the test units. Each test unit is described in detail below.

Test Unit 1 Test Unit 1 was placed outside of the west facing doorway of Feature 1, the habitation structure. The unit was excavated in 5 or 10 cm levels within stratigraphic layers (Table 13.4). It was anticipated that excavation here would reveal artifacts that were tossed from the doorway. Artifacts and charcoal were relatively abundant in the loose sediments. The original ground surface was easily

Table 13.3 Test unit results, 5LA5360, PCMS.

Test Unit No.	Test Unit Size (m)	Layers	Level	Final Depth (bgs)
1	1 x 1	2	4	31 cm
2	1 x 1	1	3	30 cm
3	1 x 1	2	3	27 cm
4	1 x 1	2	2	20 cm

recognized as a compacted silt loam. Lying unconformably above the old ground surface were large and small pieces of sandstone rocks and a very light buff to white sediment matrix. These are interpreted as the remains of the initial stages of the decay of the structure; wall stones, rubble core materials and mortar sediments.

Table 13.4 Results of Test Unit 1, 5LA5360, PCMS.

Layer	Level	Depth (pgs)	Materials Recovered
1	1	6 cm - 11 cm	Glass, cartridges casings, square nails, U.S. military button, can top
1	2	8 cm - 13 cm	Glass, cartridge casings, square nails, bottle top, finishing nails, finishing screw,
2	1	15 cm - 26 cm	Nails, glass, Kettle pod, bone, cartridge casing, ceramic jug handle
2	2	28 - 31 cm	Nail

Stratigraphy. The south and west walls were selected for profile illustration. Figure 13.10 is an illustration of the south wall. Two major strata are interpreted in this profile, and they are described below.

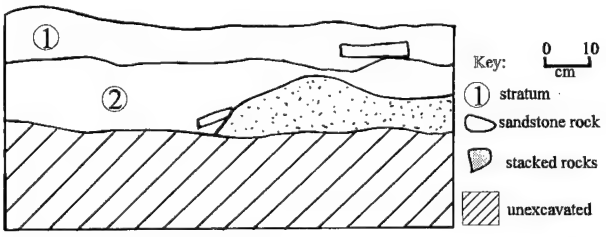

Figure 13.10 South wall profile, Test Unit 1, 5LA5360.

Stratum 1 is a silt loam with sand. Sediments are a brown (10YR 5/3) and soft; easy to excavate. The stratum contains sand to large cobble-size, subrounded and angular sandstone. Several large, tabular sandstone pieces represent building rubble, many smaller pieces of sandstone and caliche are probably chinking rubble. The lower boundary is abrupt at the compacted surface. Structure is granular and structureless. Stratum thickness ranges from 5.5 cm to 12 cm. It is a thin Soil "A" horizon and root zone developed in detrital and eolian sediments. This stratum represents post-

occupational debris from the initial decay of the structure.

Stratum 2 is a brown (10YR 5/3) to yellowish brown (10YR 5/4), heavily mottled silt loam with sand. It is slightly hard and contains large and small pieces of angular sandstone and caliche. It ranges in thickness from 2 cm to 18 cm. It possesses a granular to weak blocky soil structure. The lower boundary is clear and irregular. It rests unconformably on the old ground surface.

Test Unit 2 Test Unit 2 was placed within Feature 2, the remains of a sandstone structure (Figure 13.6) of unknown origin. The purpose of this test unit was to provide data on the function or role of the feature within the homestead; however, artifacts were few and they could not be used to discriminate feature function. Pertinent data from this test unit is provided in Table 13.5.

Table 13.5 Results of Test Unit 2, 5LA5360, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	10 cm	Glass, 5 unidentifiable nonhuman bone, metal
1	2	20 cm	No artifacts
1	3	30 cm	No artifacts

Stratigraphy. Two major strata were defined in this test unit. Wall profile drawings were completed of the south and west walls. Figure 13.11 is an illustration of the west wall. Detailed descriptions of the two strata follows.

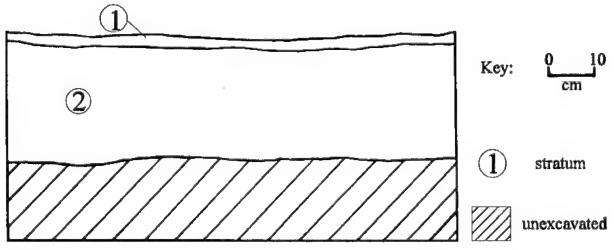

Figure 13.11 West wall profile, Test Unit 2, 5LA5360.

Stratum 1 is a brown (10YR 5/3) silt loam with sand. Sediments are soft, and structure is granular. Visible particle identification includes rounded quartz sand and gravel to small boulder-size angular sandstone and caliche. The caliche increases with depth in the stratum. A few artifacts and roots were included in this thin (<5 cm) Soil "A" horizon. The lower boundary is abrupt and wavy to irregular. The sediments are composed of eolian and residual deposits.

Stratum 2 is a brown (10YR 5/3) silt loam with clay. It is mottled with light and dark sediments throughout. Structure is weakly developed blocky. Large and small angular sandstone and caliche increase in size and in density over the previous stratum. The stratum is void of artifacts, and this stratum represents a weak Soil "B" horizon developed in eolian and residuum from preoccupational deposits. The lower boundary is unknown.

Test Unit 3 Test Unit 3 was placed over the southeast corner of the enclosure (porch) in Feature 1 (Figure 13.4). The purpose of this unit was to try and determine the role of this enclosure. Two courses of stone were found along with a large slab which appeared to be a cornerstone. These stone courses were resting on about 5 cm of sediments. These sediments were removed and the entire unit bottom was covered with large sandstone rocks. Because these stones did not appear to be a natural occurrence, unit excavations were terminated at this level. It is proposed that these stones may be the remains of a sandstone foundation predating the one visible from the surface.

The fill from the inside of the enclosure was screened separately from that on the outside. A large amount of cultural material was collected from both sides of the enclosure (Table 13.6). This material included bone, metal, and glass as well as prehistoric flaked lithics. Charcoal was noted both inside and outside of the enclosure. Some of the glass was melted and several of the bone were burned.

Table 13.6 Results of Test Unit 3, 5LA5360, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered	
			Outside	Inside
1	1	6 cm	Metal glass	1 nonhuman bone, metal, glass flaked lithics

Layer	Level	Depth (bgs)	Materials Recovered	
2	1	17 cm	Glass, metal, nonhuman bone, flaked lithics	Glass, metal, nonhuman bone
2	2	27 cm	Metal, glass	Metal, glass

Stratigraphy. The north and west walls of Test Unit 3 were profiled. Due to the complexity of the stratigraphy in the test unit, both walls are illustrated. Figure 13.12 illustrates the north wall and Figure 13.13 illustrates the west wall. The combined stratigraphic descriptions are provided below.

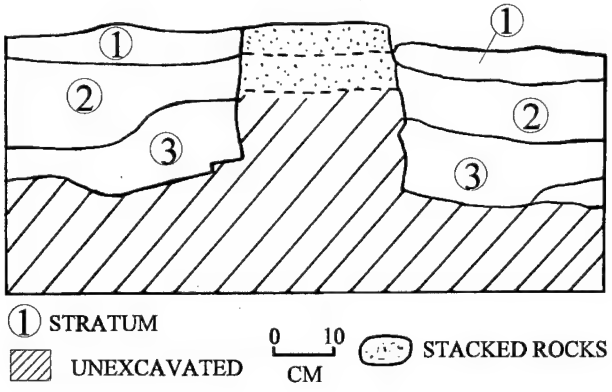

Figure 13.12 North wall profile, Test Unit 3, 5LA5360.

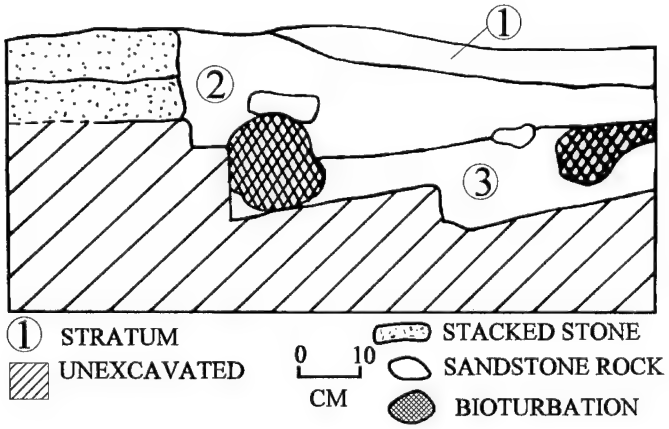

Figure 13.13 West wall profile, Test Unit 3, 5LA5360.

Stratum 1 is a 1 cm to 7 cm thick platy brown (10YR 6/3) silt loam with artifacts, caliche and gravel-size to cobble-size angular sandstone. It is soft and easy to excavate. Soil structure is granular. Structural debris, historic and prehistoric artifacts, charcoal and bone are present in this thin Soil "A" horizon. The lower boundary is clear and wavy. This stratum is composed primarily of eolian sand and silt with some residual sand. It represents post abandonment accumulation of sediments and cultural debris.

Stratum 2 is a 9 cm to 10 cm thick brown (10YR 4/3) to dark brown (10YR 3/3) sandy loam. It is soft to slightly hard. This stratum represents a clean fill that is present only on the outside of the stone foundation. It is composed of a fine to medium fine-grained sand with silt and occasional small angular sandstone and caliche. The sediments react slightly with hydrochloric acid. The lower boundary is clear. This stratum is sandwiched between the upper Soil "A" horizon and the lower cultural horizon. It represents accumulation of sediments collected on the lee side of the structure probably during as well as after the structure was abandoned.

Stratum 3 is a 5 cm to 14 cm yellowish brown (10YR 5/4) silt loam. It is soft to slightly hard and structureless. Gravel-size to small boulder-size angular sandstone and caliche are present in the stratum along with relatively large amounts of charcoal, prehistoric and historic artifacts and structural rubble mixed with mortar. This stratum is interpreted to be an accumulation of sediments and debris collected over the course of occupation of the structure.

Stratum 4 is a pale brown (10YR 5/3) silt loam. There is no pedogenic structure to the stratum which ranges from 5 cm to 17 cm in thickness. It is limited to the interior of the structure. Inclusions consist of rounded quartz sand, caliche , gravel-size to large cobble-size angular sandstone, charcoal and historic artifacts. It appears to be a combination of Stratum 1 and Stratum 3 with heavy rodent disturbance. This stratum is interpreted to be the remains of the initial structural decay mixed with the Soil "A" horizon through the process of bioturbation.

Test Unit 4. This test unit was located in an area of the site where prehistoric groundstone artifacts were observed from the surface. Since the larger and heavier groundstone artifacts are less likely to migrate across the surface of the site, it was felt that if buried artifacts or features existed at the site, they would likely be encountered in excavations near the surface groundstone artifacts. A 1 m x 1 m test unit was set up over two groundstone artifacts. This unit was excavated in two levels (Table 13.7). Five flaked lithics and the two groundstone were the only artifacts recovered from the unit.

Table 13.7 Results of Test Unit 4, 5LA5360, PCMS.

Layer	Level	Depth (bgs)	Materials Recovered
1	1	10 cm	4 flaked lithics 2 groundstone
1	2	20 cm	1 flaked lithic

Stratigraphy. The east and north wall were profiled. Two strata were identified and they are illustrated in Figure 13.14. The two strata are described below.

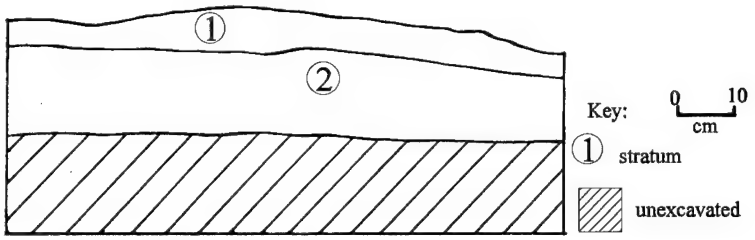

Figure 13.14 North wall profile, Test Unit 4, 5LA5360.

Stratum 1 is a brown (10YR 5/3) silt loam. It is loose and granular. Large and small angular sandstone and caliche are present along with artifacts. The stratum possesses some roots and evidence of fairly extensive bioturbation. This stratum ranges from 11 cm to 18 cm in thickness. It is a poorly developed shallow Soil "A" horizon.

Stratum 2 is a yellowish brown (10YR 5/4) silt loam with numerous sandstone and caliche gravel. It is more compacted than the previous stratum and possesses weakly developed, blocky peds . Artifacts are restricted to the areas of rodent disturbance. This stratum represents a weak Soil "B" horizon. The lower boundary is undetermined.

ANALYSIS AND INTERPRETATION

Surface reconnaissance undertaken by Fort Lewis College at site 5LA5360 showed that the total artifact assemblage numbered in the thousands. For practical purposes, a selective sample of historic and prehistoric surface artifacts was mapped and field analyzed. The sample was intended to provide a good range of artifact types, temporal indicators, and raw material types for the site.

The historic artifact assemblage at this site is viewed as primarily domestic; window glass, bottle glass, crockery, burned and unburned bone, nails, tin cans, cartridge casings, buttons, hinges, and etc. (Table 13.2). There are few examples of machinery parts or livestock pieces in the assemblage. An emphasis on the field artifact analysis was placed on bottle glass bases and cartridge casings because they are good temporal indicators, and because examples from the site had been previously studied (Carrillo et al. 1989). A total of 23 cartridges were analyzed from this site - 17 from the surface and 6 from the excavations. Both centerfire and rimfire varieties are present in the assemblage. Three known manufactures of cartridges are represented in the surface assemblage; United States Cartridge Company (US), Winchester Repeating Arms Company (WRA), and the Union Metallic Company (UMC). Additionally, a minimum of seven weapons are represented in the cartridge assemblage. The most common cartridge type identified is the .45 Colt. The .45 Colt, introduced in 1873, was adopted by the U.S. Army in 1875 and used until 1892. The sample of cartridges identified during eligibility testing were compared to those described and analyzed by Carrillo et al. (1989:402-406) and Friedman (1985:318-337), and while more varieties were identified during the eligibility testing, they support the earlier generalization reported by Carrillo et al. (1989:402), that 5LA5360 dates to the Early Settlement Period (1867-1890) on the PCMS. This site is one of three identified by Carrillo et al., dating to this period. Based upon the comparison of mean bottle dates and mean cartridge dates from the site, Carrillo et al., (1989:420) places the mean date of site occupation around 1883. Friedman documents the date of patent of 120 acres by Mosely A. Lee, on March 19, 1887 (1985:152). He further documents the number of patents between 1887 and 1900 at 9, about half of these were by persons with Anglo surnames (1985:154). A drought in 1889, followed by a national depression in 1893 caused many of the homesteaders to leave the area. The deed to the Mosely Lee property was acquired by Taylor around 1890.

Subsurface excavations produced a variety of historic artifacts, unfortunately most of these are undiagnostic glass shards (103), miscellaneous metal (97), ceramics (12), cartridges (6), tin cans (2) and nonhuman bone (30). Edge damage was noticed on several of the glass shards, and it is suspected that some of these pieces may have been intentially modified. (See Conner 1994 for a discussion of the variety of flaking scars on glass artifacts). A single military issue button was recovered from Test Unit 1 (Figure 13.15). This dates from 1855 to 1884 (FS). It is speculated that Mosely Lee may have served in the U.S. Army at one time. Physical evidence for this assumption lay in the discovery of a military issue button and in the preponderance of .45 Colt cartridges - a standard U. S. Army issue weapon of the period.

Figure 13.15 This photo taken from Gllio, et al 1980:31 is an exact representation of the military button collected from Test Unit 1, 5LA5360.

The results of subsurface investigations revealed a buried habitation surface, and the remains of a possible earlier foundation. The

historic artifacts analyzed from both surface and subsurface contexts support the archival research that site 5LA5360 was occupied between 1860 and 1890. The diversity of weapons represented by cartridge types indicates multiple uses for the firearms, such as hunting and perhaps protection. Analysis of nonhuman bone has a vertebra fragment from deer *Odocoileus* and a left humerus from *Lepus*. This site has an excellent potential to demonstrate subsistence behavior for a very early Anglo settlement in the PCMS. Discernable activity areas such as trash zones are present at the site, and they are identified by the concentration of artifact types and accumulations of burned and unburned bone.

A total of 84 prehistoric artifacts were analyzed from the site - 66 surface artifacts and 18 subsurface artifacts (2 mano fragments and 16 flaked lithics). The surface artifact assemblage is comprised of nine groundstone, three unifaces, one scraper, one core, two core tools, one core fragment, one biface, and forty-eight pieces of debitage. This assemblage does not constitute a complete inventory of all prehistoric artifacts since they numbered in the hundreds. One noticeable difference between the prehistoric assemblage from this site compared to the other sites tested is the presence of obsidian. Seven obsidian flakes were recorded at the site. One obsidian flake from the surface was submitted for obsidian hydration analysis and sourcing (Appendix III). The obsidian produced a date of AD 1305 with a standard deviation of 76 (DL-94-370). The obsidian was sourced to Cerro del Medio in the Jemez Mountains of northcentral New Mexico. It has been suggested by Carrillo (1995) that obsidian may have been utilized by the early Spanish settlers who came in contact with the indigenous inhabitants of the PCMS. It is not suggested here that this obsidian represents Protohistoric or Early Spanish contact, only that finding obsidian in a context with early settlement although the homestead is Euroamerican, and that the possible association between obsidian, flaked glass, and early Anglo settlement of the PCMS should be considered in future research.

A total of 64 pieces of nontool debitage were categorized into the four debitage categories described by Sullivan and Rozen (1985). These results are presented in Table 13.8. A high percentages of flake fragments and debris is present in the assemblage. These relative frequency between the flake fragment and debris categories and the complete and broken flake categories suggests that intensive core reduction and tool manufacture were practiced by the inhabitants at the site. One would expect these types of behaviors at the larger, multiple use sites such as 5LA5359 and 5LA5360.

Table 13.8 Nontool lithic debitage, 5LA5360, PCMS.

Complete		Broken		Fragment		Debris		Total		
N	%	N	%	N	%	N	%	N	%	
4	8.3	8	16.7	23	47.9	13	27.1	48	100	Surface
0	0	5	31.3	7	43.7	4	25.0	16	100	Subsurface
4	6.2	13	20.3	30	46.9	17	26.6	64	100	Total

The lithic material types were described using Ahler's criteria (1992) of lithic material types for the PCMS. Seven material types were identified in this assemblage. These include chert (23 - 31.5 %), quartzite (21 - 28.7 %), argillite (16 - 21.9 %), obsidian (7 9.6 %), basalt (4 - 5.5 %), hornfels (1 - 1.4 %), and silicified wood (1 - 1 %). Except for the argillite and the obsidian, the materials are available in the Purgatoire River gravel. The river is located about 5.8 km (3.6 mi) from the site to the southeast. Chert, quartzite, basalt, and hornfels have been identified in the Purgatoire River, and silicified wood has been identified in the creek gravel of tributaries of the Purgatoire River. Taylor Arroyo bounds the site to the north and east, and it is probable that this large tributary of the Purgatoire River contains local cherts and quartzites. Argillite and basalt outcrop along the Hogback - basaltic dike. The Hogback is located about 9.7 km (6 mi) south of this site. With the exception of obsidian, all lithic types are local to the PCMS. It appears that the inhabitants were utilizing both the Hogback and the Purgatoire River to gather their raw materials. This site is the closest of the eight tested to the Hogback, and this explains the preponderance of argillites in this assemblage over the other sites. However, the assemblage is not dominated by argillite or by basalt, and the river gravel remain the preferred raw material source area.

CONCLUSIONS

The eligibility testing at 5LA5360 was directed at defining the potential for subsurface deposits for both temporal components represented - historic and prehistoric. The historic component at the site was previously determined to have the potential to be eligible for nomination to the NRHP based on the archeological and archival potential of the site (Friedman 1985). A reevaluation study of the site by Larson-Tibesar Associates in 1987 demonstrated that a significant prehistoric component was present at the site as well. Larson-Tibesar Associates recommended that the site be considered as having the potential for nomination to the NRHP.

The results of eligibility testing have conclusively demonstrated that site 5LA5360 contains significant buried deposits that include a well-defined historic occupation surface, discrete historic and prehistoric activity areas, and obsidian for chronometric dating analysis. The historic component dates to the Early Settlement Period, and as such it is one of the oldest historical properties in the PCMS. Careful review of the historic artifact assemblage has provided a relatively narrow range of occupation for the site from about 1860 to 1890, and abandoned soon after. The narrow range of occupation provides the unique opportunity to yield significant archival and archaeological data concerning the Early Settlement Period of the PCMS. Over most of the site, the historic component is superimposed over the prehistoric component. The prehistoric component consists of a large scatter of flaked lithics and groundstone. The artifact scatter from 5LA5360 continues uninterrupted to site 5LA5359, an Apishapa habitation site across the slickrock to the north. 5LA5360, then, is believed to be spatially and temporally associated with this habitation site. Although no buried prehistoric horizon was identified in the subsurface tests, the site has the potential to yield significant information about the prehistory of the PCMS through the study of discrete artifact assemblages, and its potential to yield obsidian hydration dates.

CHAPTER 14

SITE EVALUATIONS AND RECOMMENDATIONS

Results from the testing project have concluded that five of the eight sites meet the requirements for significant resources under Criterion D of the National Register of Historic Places (NRHP). A brief summary of the results of eligibility testing is provided below for each site (Table 14.1). The reader is referred to the appropriate chapters for a detailed description and analysis of each site.

5LA3347

This site is considered to be potentially eligible for nomination to the NRHP based on Criterion D. This site includes a rather dense flaked and ground stone scatter on the north edge of Taylor Arroyo. Subsurface testing included the excavation of thirty-three shovel tests to determine the areal extent of the artifact concentrations. Five 1 m x 1 m test units were also excavated to establish the vertical control of subsurface deposits. Three artifact concentrations were identified and mapped during surface investigations. Three possible features were also identified. These features were mapped and tested. Over 130 surface artifacts, including flaked and ground stone, were mapped and analyzed in the field.

Shovel tests showed that surface artifacts were a fairly accurate indicator of the limits of the artifact concentrations. Test unit excavations indicated that artifacts were recovered at depths of 40 cm, with a significant number of artifacts occurring at a particular depth in the units. Although no stratigraphic break could be detected, artifact stratification indicated a buried cultural horizon.

A use surface was identified in two adjacent test units. This use surface was defined by a rock feature and a large sandstone metate. A large, circular feature (7 m in diameter) was also observed on the surface. This feature was characterized by a shallow concentration of dark silt and possible thermally altered rock. This feature was exposed in plan view, mapped, and photographed. The origin and function of the feature remain problematic; however, it is suspected to be the remains of a temporary habitation (i.e., brush shelter). A Middle Archaic, stemmed projectile point was recovered from the surface of the site during this testing phase.

5LA3570

This site is considered to be potentially eligible for nomination to the NRHP under Criterion D. This site consists of a flaked and ground stone scatter, exposed features, and the possible remains of a stone enclosure. The geomorphology of this site is a significant factor in its eligibility determination. The site is located on a thick deposit of alluvium (overbank sediments from Lockwood Arroyo) at the confluence of Lockwood Arroyo and an unnamed

Table 14.1 Results of eligibility testing by FLC in PCMS, 1994

Site	Person Days	Site Size (m^2)	Test Unit (N)	Shovel Test (N)	Eligibility Status
5LA3347	14	14,000	5	33	yes
5LA3570	22	7,629	4	0	yes
5LA4603	9.5	5,181	3	24	no
5LA4606	11	10,299	4	29	no
5LA4632	8.5	4,404	2	21	yes
5LA4854	11	453	4	5	no
5LA5008	17	55,421	6	33	yes
5LA5360	12	18,840	4	0	yes
Total	105		32	145	5 yes, 3 no
Mean	13		4	18	

mean = 13.1 days
medium = 11.5 days
mode = 11 days

tributary of Lockwood Arroyo. A low sandstone bluff along the northern portion of the site mayhave been utilized as part of a habitation structure. Other surface features included a midden deposit and several hearth or roasting features. A possible game-drive feature was identified on the ridge above the site. Over fifty flaked and ground stone artifacts were mapped on the surface of this site. Four test units were excavated at this site. Three of these were placed in possible features. The other unit was excavated in an open area to test for deeply buried deposits. The results of the test unit excavations, cut bank interpretations, and the presence of visible surface features demonstrate that the site contains intact buried deposits. Datable features and feature morphology can provide further information about subsistence and settlement behavior in the PCMS. Based on the diagnostic artifacts, radiocarbon dates, and an obsidian hydration date, the site dates from the Late Archaic to probably the Middle Ceramic Period. An additional attribute at this site is the deep alluvium on which the site is located. This geomorphological situation is uncommon (although not unique in the PCMS), and the potential of this site to contribute knowledge about the geoarchaeology of PCMS is considered to be of significance in determining site eligibility status.

5LA4603

This site is not considered to be eligible for nomination to the NRHP. This site consists of a sparse lithic artifact scatter located along the flat steppe adjacent to the canyon rim of a small tributary of Iron Canyon. There was no indication of artifact concentrations or activity areas from the surface.

Subsurface excavations consisted of a series of shovel tests across the site and three 1 m x 1 m test units. Twenty-four shovel tests were placed at 5 m intervals across the site. Three of these produced a total of four subsurface artifacts that were recovered from the surface to 20 cm below the surface. One test unit was placed so that it would bisect two upright pieces of angular sandstone - the only visible surface anomaly at the site. Two additional units were placed within the area of highest artifact density and greatest potential for stable subsurface deposits. None of the units produced evidence of buried features or buried cultural horizons. Ten subsurface artifacts were recovered from the three test units. Based on the reuslts of eligibility testing, the site does not appear to have the potential for significant subsurface deposits.

5LA4606

This site is not considered to be eligible for nomination to the NRHP. This site consists of an open, lithic artifact scatter located on the steppe near the rim of Bent Canyon. A total of eighty-nine artifacts were located on the surface. Four small artifact concentrations were defined. A dense scatter of flaked and ground stone artifacts outside the site boundary to the west were mapped as a separate site based on the difference in diagnostic artifacts between the two sites (i.e., Middle Archaic projectile point verses Ceramic Period corner-notched projectile point), the diversity between material types of the artifacts, and the distance between the two artifact concentrations.

Twenty-nine shovel tests and four 1 m x 1xm test units were excavated at 5LA4606. Seven of the twenty-nine shovel tests contained subsurface lithic artifacts. These artifacts were recovered from depths of between 0 cm to 10 cm below the surface. Test units were placed in areas of probable soil deposition and in situ soil development, and within areas identified as having the greatest potential for subsurface artifacts based on the results of surface survey and shovel testing. One of the four test units was void of artifacts. A total of nineteen lithic artifacts were recovered from test unit excavations. These flakes were primarily located in the upper 20 cm of the test units. The results of stratigraphic interpretation did not reveal the presence of a buried cultural horizon.

5LA4632

This site is considered to be potentially eligible for nomination to the NRHP based on Criterion D. This site is located along a narrow bench between Bent Canyon and a low, sandstone rimrock. Surface artifacts include a relatively dense scatter of flaked and ground stone artifacts.

The geomorphological situation at this site is one of residual accumulation of sediments from the eroding Dakota Sandstone bedrock. A sand matrix comprises the entire stratigraphic profile from surface to bedrock. A slight rise in the topography just south of the rimrock indicates a buried sandstone outcrop similar to the one exposed to the north of the site.

Two flaked and ground stone concentrations were identified and mapped from the surface. A series of shovel tests were excavated in one of these concentrations. A total of twenty-two shovel tests and two1 m x 1 m test units were excavated at the site. Twelve of the twenty-two shovel tests contained buried artifacts. A complete mano was recovered from a shovel test, as well. One test unit was placed adjacent to the exposed bedrock sandstone rim. This test unit was excavated to the bedrock. The first ten centimeters were void of artifacts, while the second ten centimeters contained seventeen lithic artifacts, including one core tool. A second unit was placed in an area with deeply buried deposits (based on results of shovel testing). This unit was excavated to sandstone bedrock 70 cm below the surface. The first and last 10cm levels were devoid of artifacts, while the remaining five levels all produced lithic artifacts. In both test units, a darker hue was identified in profile, and this stratigraphic break was accompanied by an increase in artifact density and the presence of charcoal. It is believed that this site containes an in situ buried cultural horizon and is, therefore, a significant archaeological property.

5LA4854

This site is not considered to be eligible for nomination to the NRHP. This site consists of an amorphous stone enclosure and a single projectile point base. The projectile point base was collected during site inventory, and no surface artifacts were identified during the testing phase. A line of shovel tests was placed south of the enclosure and four test units were excavated within the site boundary. Two 0.50 m x 2 m profile trenches were placed within the stone enclosure, and two 1 m x 1 m units were located beyond the perimeter of the stone enclosure; one unit was

excavated in the vicinity of the collected projectile point base. The latter two test units produced no artifacts. One core fragment and one small flake were recovered from the trench excavations within the stone enclosure. All soil from the profile trenches was screened through ⅛" mesh. Sediment accumulation of 6-9 cm under the supposed "wall" rocks indicates the sediments were present prior to occupation. No compacted surface, oxidation, charcoal or upright sandstone slabs were observed in the feature. If this feature is cultural; it received marginal use. The absence of surface artifacts or features, and the lack of a buried cultural horizon, reduces the potential significance of this site.

5LA5008

This site is considered potentially eligible for nomination to the NRHP based on Criterion D. This site consists of an extremely large, but diffuse, flaked and ground stone scatter. It is located along the crest of a low ridge below a prominent mesa just north of the head of Bent Canyon. The shallow ruts of an old road, possibly a stage route, run north to south through the site. A sample of fifty surface artifacts were mapped at the site. Excavations consisted of a thirty-three shovel tests and six 1 m x 1 m test units. Two of the thirty-three shovel tests produced buried artifacts.

While the density of artifacts at the site is low relative to the site area, results from the subsurface testing demonstrated the presence of a use surface. This interpretation is based primarily on the site geomorphology. The limestone bedrock erodes in a step-like fashion resulting in eolian and residual silt accumulating in the depressions between outcrops where the silt has buried artifacts. The surface of the limestone outcrop can, in places, be followed into the depressions where artifacts lay on a compacted caliche surface. This geomorphic situation has preserved a buried cultural horizon that is contemporaneous with artifacts on the outcropping limestone bedrock . Essentially, the limestone bedrock and the compacted caliche layer are a single time-transgressive cultural surface.

5LA5360

This site is considered to be potentially eligible for the NRHP based on Criterion D. The site is a multiple-component prehistoric and historic site located above the canyon rim southwest of Taylor Arroyo. The prehistoric component consists of a large but widely dispersed scatter of flaked and ground stone artifacts. Many of the artifacts have the appearance of having been displaced and even tumbled across the bedrock; others, such as large metate fragments, are probably in situ on the ground surface or on the sandstone bedrock. The most interesting characteristic noted about the prehistoric component is the diversity of lithic materials, in particular the presence of several obsidian flakes. Over sixty flaked and ground stone artifacts were mapped on the surface of the site. This number, however, is a sample of the total artifact assemblage, which numbers in the thousands. Bedrock mortars and simple stone features are present as well. The historic component consists of the remains of three standing structures, a relatively dense scatter of trash, and several stone alignments of unknown function. Just over fifty historic artifacts were mapped at the site. Historical documentation showed the homestead to have been patented in 1887 by Mosby Lee, a Confederate veteran of the Civil War.

Four 1 m x 1 m test units were excavated at the site. Three of these were placed within or adjacent to the standing structures to test for undisturbed buried deposits. One unit was placed in an area of prehistoric flaked and ground stone artifacts. The test unit in the prehistoric component failed to reveal the presence of a buried cultural horizon. Results from the subsurface tests within the historic component demonstrated that intact historic deposits are present at the site. These deposits were observed below the wall rubble in front of the main habitation unit and within the stone foundation assumed to be a porch.

Interpretations of surface and subsurface historic artifacts show that the site was occupied during the period from 1860-1890, abandoned soon after 1890 and never occupied again. This unique situation provides an excellent opportunity to gain significant archival, as well as archaeological, data concerning the Early Settlement Period in the PCMS. Although no buried prehistoric horizon was identified during testing, the site has the potential to yield significant information about the prehistory of the PCMS. The prehistoric artifact scatter continues uninterrupted to site 5LA5359, an Apishapa habitation site.

CHAPTER 15

CONCLUDING SUMMARY

INTRODUCTION

In the summer of 1994, Fort Lewis College, under a cooperative agreement with the Midwest Archeological Center of the National Park Service, conducted evaluative testing of eight cultural resources to determine eligibility to the National Register of Historic Places (NRHP). Five of the eight are found to be potentially eligible for nomination to the NRHP: 5LA3347; 5LA3570, 5LA4632; 5LA5008; and 5LA5360. The remaining three sites - 5LA4603, 5LA4606 and 5LA4854 - are considered not eligible for nomination to the NRHP.

SITE GEOARCHEOLOGY

The eight sites tested are located in three of the four landscape units described for the PCMS: the Hills; Steppes; and Arroyo/Canyons (Schuldenrein et al. 1985). One site is located in the Hills Landscape Units, one site is located in the Arroyo/Canyon Landscape Unit, and the remaining six are located in the Steppes (Figure 1.2). This is not surprising since the Steppes cover approximately half of the PCMS. With the exception of 5LA4854, the sites located in the Steppes are all adjacent to canyon rims. The bedrock lithology of the sites is consistent with that over most of the PCMS. Cretaceous age sandstones underlay most of the Steppes and are often exposed in the Arroyo/Canyon Landscape Unit.

A thin soil "A" horizon overlies a weak soil "B" horizon over most all of the sites tested. The soil is developed in a sandy residuum from the underlying bedrock with some eolian sediments mixed in. Although weak, these soils often represent most of the Quaternary Period. Sediments for soil development accumulate through colluvial movement, residual weathering, and, to a lesser extent, eolian processes. It is suggested that eolian processes have affected many sites in the PCMS through both sediment loss as well as through sediment accumulation. Soils in the sites tested in the Steppes are, for the most part, shallow, and cultural horizons are difficult to identify. Artifacts continue from the surface through the first 10 cm and usually decrease rapidly after 10 cm to 20 cm. Pedoturbation, primarily caused by grass growth and animal burrowing, is often a significant factor in the translocation of artifacts through the soil profile.

The geoarcheology of individual sites has already been discussed earlier in this volume. The following section emphasizes some conclusions about the geoarcheology drawn from the current work that might assist future archeological investigations in Pinon Canyon.

First, it is clear that there is no simple correlation between surface artifact accumulations and buried deposits. This was especially apparent at 5LA3347, located along the north edge of

Taylor Arroyo. Subsurface investigations at 5LA3347 demonstrated that areas of differential sediment accumulation are often difficult to recognize from the surface. Furthermore, surface artifact concentrations do not necessarily imply likely places for buried deposits. In fact, surface scatters often imply no buried deposits because they are in deflated location. Meanwhile, areas without visible deflation have no surface artifacts but contain intact subsurface components.

Secondly, attention should be paid to the importance of local geomorphology both in terms of creating attractive microenvironments for prehistoric inhabitants and also for the effect such occupation might have on site integrity. For instance, at 5LA5360, water was available from a variety of sources: deep pools at the confluence of Taylor Arroyo and an unnamed arroyo (a result of large rock block slides that dam the runoff), catchment pools on the slickrock, and an free-flowing spring. The land surrounding these water sources are excellent places for archeological properties. Human activity, such as the construction of buildings, can facilitate the accumulation of artifacts and sediments, and the preservation of use surfaces. Nevertheless, pedoturbation on sites such as 5LA5360 is pervasive. Similarly, the position of site 5LA4632 protects it from northerly and westerly winds. The effects of moisture retention and solar radiation create a microclimate at this site whereby a low rate of transevaporation produces a more humid environment. As a result of this particular climatic situation and the steady supply of sediments to the site, this topographic situation holds an excellent potential for yielding archeological sites in good geoarcheological contexts.

Thirdly, 5LA5008 is situated along the limestone escarpment of the Big Arroyo Hills. This is the only site from our sample that is located on bedrock other than sandstone. The limestone erodes in a step-like fashion that gradually erodes toward the crest of low hills. Sediment accumulation in these areas is confined to localized bowls and to shallow depressions at the rear of the limestone steps. Artifacts found on the bedrock and buried in the depressions are concentrated at the interface between the bedrock and the areas of sediment accumulation. Erosion at this site does not appear to be severe. The majority of artifacts on the bedrock do not appear to have migrated far from their original location. This bedrock represents the prehistoric occupation surface, which continues into the areas of sediment accumulations. Artifacts are concentrated in discrete loci or activity areas. Sites such as 5LA5008, in this type of geomorphological situation, may not contain easily recognizable cultural horizons, but they possess the unique opportunity to study the loci of behaviors from the ground surface as well as from shallow sediment deposits. Schuldenrein et al. (1985:19) discusses this geomorphological context as having the potential to produce only "find spots" (archeological materials in poor or questionable geological context, mainly occurring as surface artifacts). Sites like 5LA5008 could challenge this proposal.

Finally, site 5LA3570 is situated on an alluvial floodplain along a meander loop of Lockwood Arroyo. One prehistoric occupation is identified from the surface, while three are buried beneath alluvium. A prehistoric hearth was exposed just below the surface in a the wall of a gully. This feature dates to 2750±80 BP, and this hearth represents the oldest dated component at the site thus far. Along the eastern edge of the site adjacent to Lockwood Arroyo a large cut

bank profile has exposed over three meters of alluvium, overbank deposits from Lockwood Arroyo. This depositional sequence of silts and sands is interrupted by at least two apparent periods of human occupation. These occupational horizons were identified in the cut bank by lenses of fire-cracked rock, ash, and charcoal (no artifacts were recovered from the cut bank profile). The two occupational horizons are separated by 70 cm to 100 cm of alluvium that was deposited during a 200 year period between 1350±60 BP and 1510±50 BP.

Samples were collected from the strata for pollen analysis. Pollen preservation from the strata was excellent and several species were represented in the samples. The results from the analysis showed an increase in spruce pollen from top to bottom in the cut bank profile. This increase in spruce pollen is accompanied by a decrease in juniper pollen from top to bottom. Spruce trees are not present in the vicinity of this site, nor are they common in the PCMS at present. Juniper is the dominate conifer in the PCMS. The change through time in the frequencies of spruce and juniper pollen is interpreted to be the result of an environmental shift from a slighter wetter to a slighter drier climate for the PCMS over the last 1500 years. A decrease in ground cover-the result of more xeric climatic conditions-often results in accelerated surface erosion followed by arroyo incision and rapid sediment accumulations in the lower reaches of the streams.

Rapid sediment accumulation increases the potential for site preservation by blanketing the site with layers of alluvial; however, in a sinuous alluvial environment such as that of Lockwood Arroyo sediment accumulations at one position may be accompanied by extensive erosion at another position within the system. The site is located on a remnant of floodplain alluvium that may be the remains of a small alluvial terrace. Older cultural deposits are present at the inner edge of the site, and near the sandstone outcrop. The older deposit was not, however, identified in the cut bank profile. It is unlikely that this prehistoric deposit would have sloped to such a grade that it would be buried beneath the bottom of the exposed cut bank. It is more likely the deposit either never extended across the entire landform or it has since eroded from this portion of the site.

Currently this site is experiencing accelerated erosion that is compromising the site's archeological context. The edges of the site are subject to rapid gully erosion that is transporting sediments and archeological materials downslope to the arroyo channel. The gully erosion is a product of the lack of well-established vegetation and the channeling of slopewash across the site and into the gullies.

SITE ARCHEOLOGY

The eight sites tested represent both prehistoric and historic cultural periods. These sites have the potential to contribute substantial knowledge to the different research domains established by Andrefsky (1990). With the exception of a historic component at one site, all represent the remains of hunting-and-gathering peoples who occupied the PCMS until the arrival of the Europeans.

A time span from the Late Archaic through to the Ceramic Periods is represented at these sites. Projectile points date to the Archaic Period; radiocarbon assays for the sites range from approximately 3,000 years ago to the middle of the first millennium A.D. Two obsidian hydration dates fall in the late 13th and early 14th centuries. The obsidian was sourced to the Jemez Mountains of north-central New Mexico (Cerro en Medio and Polvadera Peak sources).

The pollen analysis, although lacking definitive ethnobotanical indicators, indicated that pollen preservation is excellent in the PCMS, and that there exists the potential for reconstructing past environments from arroyo sediments. This is a significant finding because paleoecological records are rare in southeastern Colorado.

Lithic artifacts are the most abundant artifacts on the sites. All lithic raw material types identified during this project can be found within the confines of the PCMS with the exception of obsidian from New Mexico. Quartzite, chert, argillite, and basalt are the most widely used raw material types and are found on every site tested with the exception of 5LA4854, which only had three artifacts. Lesser amounts of hornfels (both fine and coarse), chalcedony, and silicified wood were also noted. Hornfels was present on every site but 5LA4603, which had a sample size of only 34 artifacts.

All of these raw material types, except for argillite, can be found either in or along the Purgatoire River. Cherts and quartzites outcrop from Late Jurassic and Upper Cretaceous age deposits along the walls and slopes of Purgatoire Canyon. Chert, chalcedony, and silicified wood have been observed in the lower reaches of tributary canyons including Lockwood Arroyo and Bent Canyons. Basalt, hornfels, quartzite, and chert are present in Quaternary age gravel deposits in the Purgatoire River (Ahler 1992).

Argillite and basalt outcrops are found along the Hogback-basaltic dike located on the south edge of the PCMS. Apparently, argillite only occurs near the east end of Hogback while basalt can also be obtained in the Purgatoire River. The two sites, 5LA4603 and 5LA4606, with the highest percentages of argillite are also two of the more distant sites from the Hogback. Known argillite deposits are over 20 miles from 5LA4603 and 5LA4606. This suggests that the inhabitants of these hunting camps may have come from more permanent sites nearer the Hogback, or it may simply mean that argillite was obtained on their way down the Purgatoire River, with travelers stopping occasionally for hunting forays up tributary canyons. Argillite is present in much lower percentages (<12%) at other sites where more locally obtainable raw material types are relied upon. Obsidian, the only identified exotic raw material type, was recovered from two sites, 5LA3570 and 5LA5360.

The lithic artifact assemblages for each of the sites were examined in order to gain an impression of lithic reduction technologies; both core reduction and tool manufacturing are evident. At sites 5LA3347, 5LA3570, and 5LA5360, both activities appear to have been practiced. Tool manufacturing activities appear to be more prevalent at site 5LA5008 based on observation of the number of tools present. The sites with more evidence of tool manufacture or

equal indicators of tool production and core reduction also contain more remains of formal tools than the other sites examined. Tools at the other sites appear to be of a more expedient nature. Core-reduction activities were more apparent at 5LA4606 and 5LA4632. All of the aforementioned sites, with the exception of 5LA4606, have either buried cultural deposits or are directly associated with other buried deposits (5LA5360). The higher percentages of groundstone artifacts, both surface and subsurface, are associated with these same five sites. The other three sites have little if any groundstone present. This would indicate that sites with significant amounts of groundstone artifacts have a higher probability of having definable buried cultural horizons.

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Appendix I

Radiocarbon Dates from Three Archaeological Sites in the PCMS, Fort Lewis College.

Beta No.	Site No.	Field No.	Provenience		Sample Context	Conventional radiocarbon age *	Calibrated radiocarbon age **	Intercept date with calibration curve	Comments
			Horizontal	Vertical					
78658	5LA3570	28	Arroyo	Stratum 4	Charred Material	1510+/-50 BP	AD 535 - 620	AD 575	AMS Analysis
78659	5LA3570	26	Arroyo	Stratum 2	Charred Material	1350+/-60 BP	AD 615 - 790	AD 670	AMS Analysis
78661	5LA4632	15	Test Unit	Level 7	Charcoal	1810+/-60 BP	AD 85 - 390	AD 235	AMS Analysis
79751	5LA3570	30	Feature 11(Hearth)	Full Cut	Charcoal	2750+/-80 BP	BC 980 - 815	BC 890	Standard Analysis

* 1 sigma
** 2 sigma

Appendix II

POLLEN ANALYSIS OF SEDIMENT SAMPLES FROM EVALUATIVE TESTING OF CULTURAL RESOURCES, PINON CANYON MANEUVER SITE, LAS ANIMAS COUNTY, COLORADO

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INTRODUCTION

Data documented in this report comes from the analysis of 14 pollen samples submitted by Dr. Phil Duke, Fort Lewis College, as part of the archaeological investigations in the Pinon Canyon Maneuver Site (PCMS) of southeastern Colorado. The project area is in Las Animas County, Colorado, located immediately east and southeast of the town of Thatcher. The purpose of the archaeological work was to conductevaluative testing on eight cultural properties for recommendation to the National Register of Historic Properties. The purpose of the palynological investigation reported here was to examine stratigraphic samples for paleoenvironmental data, as well as samples taken from cultural contexts, potentially useful for determining economic use of plant resources.

Archaeological sites within the Pinon Canyon Maneuver Site lie between ca. 1310 m (4300 ft) and 1830 m (6000 ft) elevation. The mean annual precipitation and temperature for the PCMS are 26.4 cm and 11.5 degrees C, respectively. Though considered semi-arid, the precipitation regime is biseasonal, with most of the precipitation falling between March and May, and July and October.

Vegetation within the project area has been described by Shaw et al. (1987). (This reference was unavailable to this author). Shaw et al. (1987) describe over 350 species distributed in 26 plant communities which occur in the PCMS. Higher elevations within the area are dominated by junipers (Juniperus sp.), with lesser amounts of pinyon pine (Pinus edulis). Other regions of the study area are dominated by a variety of shrubs and grasses, including saltbush (Atriplex), rabbitbrush (Chrysothamnus), Russian thistle (Salsola kali), plantain (Plantago), sagebrush (Artemisia), prickly lettuce (Lactuca), and prickly pear and cholla cactus (Opuntia sp.), among others. Riparian communities in the many local canyons include species of aspen and cottonwood (Populus spp.) and willow (Salix sp.).

METHODS

Fourteen sediment and pollen wash samples were processed at the Laboratory of Paleoecology using a heavy liquid flotation technique to separate pollen from sample sediments. Sample bag contents were thoroughly mixed and 20 cc subsamples were extracted. A known concentration of exotic spores (Lycopodium) was added to the subsamples to estimate pollen concentration and monitor any degradation resulting from chemical processing. Subsamples were treated with 10% hydrochloric acid to remove carbonates, washed through 0.18 mm mesh screen, then floated twice in zinc bromide (specific

gravity 2.0). Following flotation, samples were treated with hydroflouric acid (to remove silicates), rinsed, stained with safranin, then washed with alcohol and mixed with glycerol. In addition, several samples needed an additional screening step to remove clays (Cwynar et al. 1979).

Pollen assemblages were identified by counting slides from the processed samples on a Leitz microscope. Entire slides were examined by counting transects at 400x magnification to a pollen sum. Because of differences in pollen preservation, the pollen sum varied from ca. 100 grains to well over 400 grains. The remaining transects were scanned at 100x magnification to record any taxa not observed in the original 400x magnification counts. Aggregates of individual taxa were included in the sum as one grain per occurrence and a separate tally was made of the number of grains within individual aggregates. Identifications were made to the lowest taxonomic level possible aided by comparison to the Laboratory of Paleoecology pollen reference collection and to published references (Kapp 1969; Heusser 1971; Moore et al. 1991).

RESULTS

The addition of exotic tracers during processing allows an estimate of each sample's pollen concentration (number of pollen grains per cc of sample) calculated as a ratio of the pollen sum to the number of tracers encountered multiplied by the tracer concentration and divided by sample volume. Sample concentrations were moderate to high, compared to pollen concentrations from other archaeological sites and contexts, as well as stratigraphic profiles. Table 1 lists pollen and aggregate counts by taxa and the calculated pollen concentration for each sample. Table 2 lists pollen percentages. Figure 1 graphically depicts the dominant taxa plotted as percentages of sample pollen sums - sterile samples were not graphed. Twenty-seven distinct taxa were identified in the 14 samples. The percentage of degraded pollen grains was generally under 10%.

Eight of the 14 samples yielded 300 grain or better counts, while two samples had 200, and two other samples had 100 grain counts. Two additional samples (5LA4632 strata 2 & 3) were considered barren of pollen after initial counts showed extremely low pollen concentrations (104 and 52 grains / cc, respectively). Pollen from the top four samples of the stratigraphic profile (5LA3570, strata 1 - 4) contained abundant pollen, averaging over 23,000 grains / cc. Pollen wash samples also had high pollen concentration values, with one sample (5LA5008, FS 101) exceeding 500,000 grains / cc.

The dominant taxa in 8 samples with counts exceeding 100 grains or greater is Chenopodiaceae-Amaranthus (Cheno-Am), a broad category encompassing several genera such as goosefoot (Chenopodium), amaranth (Amaranthus) and saltbush (Atriplex).

Juniper (Juniperus) dominates the pollen assemblage of three additional samples, while members of the Compositae (sunflower) family dominate one of the pollen washes. The Compositae pollen is subdivided into ragweed-type (Ambrosia, variable in percentage), sagebrush (Artemisia, also variable), Other Compositae (consistent and abundant), and Liguliflorae (rare). Other taxa present in variable quantities include pinyon pine (Pinus edulis-type), other pine (probably ponderosa pine - P. ponderosa-type), spruce (Picea), and grass (Gramineae). Less commonly represented pollen types include oak (Quercus), fir (Abies), globe mallow (Sphaeralcea), buckwheat (Eriogonum), mint (Labiatae), and others. Aggregates of the dominant taxa are also found in these samples. Aggregate occurrence indicates (1) a local plant (fused pollen grains that have not separated at anthesis) or (2) plants transported to the site or (3) site-processed plant material, all of which can result in flower parts or microsporangia becoming concentrated.

INDIVIDUAL SAMPLE REPORTS

In this section I describe the pollen assemblages from each of the processed samples. I divide this section into discussions of the arroyo samples from Site 5LA3570, the Feature 11 also from Site 5LA3570, Testing Unit 1 from Site 5LA4632, and samples from pollen washes.

Arroyo Samples from Site 5LA3570. Five arroyo samples were collected from this site to yield a paleoenvironmental record. Pollen preservation was excellent and pollen was abundant in samples from strata 1, 2, 3, and 4, while pollen was much more poorly preserved and less abundant in strata 5. A radiocarbon date from stratum 4 dates this stratum to 1510 ± 50 yr BP (calendar AD 435 to 650). The profile also indicates an increase in CaCO3 downcore section, which may explain the lowered pollen concentrations of the lowermost samples.

The pollen is dominated by Cheno-Am pollen, comprising over 60% of the sum (Table 1; Figure 1), except in stratum 5, where Cheno-Am percentages drop to 35%. Percentages of Other Compositae pollen increase from the top of the section to the bottom. Conversely, juniper pollen declines from top to bottom, then increases slightly in stratum 5. Pollen from other conifers show interesting results. The most abundant conifer is Other Pines, probably ponderosa pine, found consistently in percentages of 7 to 12%. These percentages are low enough to suggest that the tree probably does not grow near to the site today, although small populations of ponderosa grow near the project site today (Feiler 1994) and along the Colorado - New Mexico border southwest of the PCMS (Oliver and Ryker 1990). With the exception of the count from stratum 5, pinyon pine increases toward the surface. Conversely, spruce pollen declines from bottom to top.

Paleoenvironmental inferences drawn from these data

suggest subtle environmental changes from the profile bottom to the top. Though the bottom sample is somewhat anomalous, the decline in spruce and increase in juniper from bottom to top suggest an evolutionary climate regime. Spruce trees are not local to the site, so the probably source of this pollen is from higher elevations to the west. The decline through time may be indicative of a decline in abundance of spruce trees to the west, a decline in the influence of westerly circulation, or both. The increase in pinyon and juniper through time suggest that the woodland community has become more important locally than it was at some time in the past - the time of deposition of the lower strata in the profile.

Feature 11 from Site 5LA3570. Feature 11 is a basin-shaped hearth located in an arroyo. A radiocarbon date places the age of hearth fill at ca. 890 BC (Beta-79751). The two pollen samples were taken from stratum 2, a brown silt loam with charcoal, and stratum 3, the bottom of the feature. Both pollen samples were dominated by Cheno-Am and Other Compositae pollen. They differed, however, in that sample FS 31 (pollen matrix sample) contained considerably greater percentages of pinyon and juniper pollen, with globemallow and buckwheat, while sample FS 30 contained spruce pollen but lacked pinyon and juniper pollen completely. Based upon the arroyo pollen samples discussed above, the two samples may be separated with respect to time of deposition.

Considerable aggregates of both Cheno-Am and Other Compositae pollen were recovered from FS 31, while these aggregates were rare or non-existent in FS 30. Occurrence of aggregates is interpreted as actual occurrence of the plant nearby, as explained above. Although plants that produce Cheno-Am and buckwheat pollen can be ethnobotanic, it is not known whether these plants were used by Late Archaic Period peoples of the area.

Testing Unit 1 from Site 5LA4632. Three pollen samples were analysed from Testing Unit 1, Site 5LA4632. Unfortunately, only one of the samples contained pollen in quantities to be statistically significant. Pollen from the uppermost stratum (Control, FS 12) was well preserved and was dominated by juniper pollen (73.6%), with considerably lesser amounts of Cheno-Am and Other Compositae pollen (8.0 and 5.7%, respectively). Only minor amounts of sagebrush, pinyon and other pine pollen were found (Table 1; Figure 1). Curiously, a single grain referable to pondweed (Potamogeton) or cattail (Typha) was also found in this stratum, which, if the site is not located immediately near a wash, suggest long-distance transport of riparian pollen. Cattail pollen can be transported distances by the wind, but it is unlikely that pondweed pollen would do so.

As mentioned above, pollen from stratum 2 and stratum 3 (determined to have cultural material) was absent.

A fourth pollen sample from this location was analysed from a mano, recovered 20 cm below the surface. I will discuss this below.

Pollen Wash samples, and associated control. Three pollen samples obtained from washes of artifacts (2 manos and a single metate), as well as a single control pollen sample, are discussed in this section. The surface sample and two pollen washes come from Site 5LA5008. The surface sample is dominated by nearly equal proportions of Cheno-Am and juniper pollen (24.5 and 23.2%, respectively), with significant amounts of pinyon, other pine and other Compositae pollen. Sagebrush pollen percentages are at their maximum (4.4%) in this sample. This control sample is in significant contrast to the two pollen wash samples from this site.

Both pollen wash samples (FS 101, a metate; and FS 102, a mano) contain significantly greater juniper percentages than the control sample, with lesser amounts of Cheno-Am and Other Compositae pollen. Buckwheat pollen occurs in all of these samples. Two explanations are possible for the high juniper pollen concentrations. First, the pollen adhering to the metate and mano originate from sediment deposited when juniper trees were more important, or at least as important, locally than they are today. Second, the high juniper pollen may be ethnobotanically significant, and represent processing of juniper berries. This is less likely, since I would expect little pollen to adher to juniper berries after the growing season. The high juniper pollen may indicate that the groundstone was used during late spring, when juniper typically pollinates. The high percentages of other pine pollen (not known to be ethnobotanically important) supports the first explanation.

However, the pollen assemblage from the pollen wash obtained from the mano recovered at Site 5LA4632 contains the most unusual pollen assemblage of any of the 14 pollen samples analysed in this study. It is dominated by Other Compositae pollen, with lesser amounts of Cheno-Am and juniper pollen. None of the other surface or environmental pollen samples have as high a percentage of Other Compositae as occurs in the pollen wash from this mano (33.3%). It is tempting to ascribe the high percentages of this insect-pollinated pollen type to ethnobotanic usage, an explanation not entirely supported by the data, which include a lack of aggregates of the pollen type. The data for this sample are, thus, equivocal.

DISCUSSION AND CONCLUSIONS

Few independently derived paleoenvironmental records exist for southeastern Colorado. An exception is the recent work by Feiler (1994), who analysed plant remains and pollen from packrat (Neotoma) middens from West Carrizo Canyon. Feiler

also noted a recent (within the last few hundreds of years) increase in the amount of pinyon pine, and that juniper was a dominant in virtually all of the middens in the 6000-year series. In addition, Feiler noted long-distance pollen types, most notably fir pollen, in his middens, which he ascribed to populations in the Rocky Mountains to the west. Although the pollen profile presented here does not have chronological control, broad similarities exist between the interpretations based upon the arroyo profile, and the midden series of Feiler (1994). Feiler's detailed reconstruction of climate variations over the past 6000 years cannot be matched by the few samples obtained from the arroyo profile.

Definitive ethnobotanic pollen indicators were not identified in this analysis, although the pollen assemblage from one mano was distinctive enough to raise questions regarding this issue. However, pollen preservation and concentration was excellent in most samples, signifying that good potential exists for reconstruction paleoenvironments locally from arroyo sediments. This is not an insignificant finding, since paleoecological records within the area are rare, and our ability to interpret the environment within which early Native Americans of the area lived is dependent upon such records. Additional studies should be undertaken to clarify the questions raised by these data. It would be particularly important to obtain additional radiocarbon dates on the stratigraphic profile in this regard.

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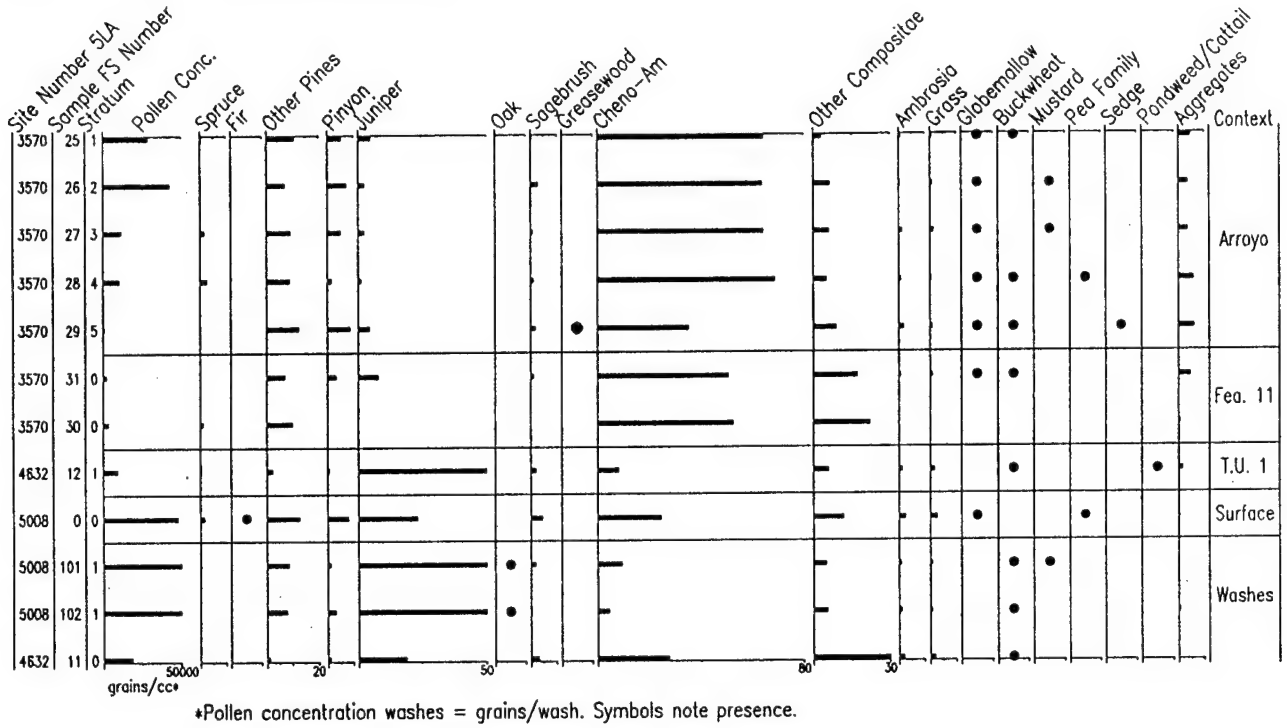
Figure 1. Pollen Percentage Diagram.



*Pollen concentration washes = grains/wash. Symbols note presence.

Table 1. Pollen Data.

Site Number		5LA3570	5LA3570	5LA3570	5LA3570	5LA3570	5LA3570
Sample FS Number		25	26	27	28	29	31
Stratum/Context		1	2	3	4	5	Feature 11 Matrix
Pollen Sum		319	344	315	312	114	217
Tracers		15	11	36	41	186	148
Pollen Concentration grains/cc or grains/wash		28710.0	42218.2	11812.5	10273.2	827.4	1979.4
Taxa Name	Common Name						
Degraded	Unidentifiable	13	14	12	8	14	14
Picea	Spruce	1	1	5	8	0	0
Abies	Fir	0	0	0	0	0	0
Other Pinus	Other Pines	34	24	29	28	14	15
Pinus edulis	Pinyon	17	25	16	5	10	7
Juniperus	Juniper	15	8	7	3	5	17
Quercus-type	Oak	0	0	0	0	0	0
cf. Fraxinus	Ash	0	0	0	0	0	0
Artemisia	Sagebrush	1	9	2	3	2	2
Ephedra	Mormon Tea	0	0	0	1	0	0
Cercocarpus	Mountain Mahogony	0	0	0	0	0	0
Sarcobatus	Greasewood	0	0	0	0	2	0
Cheno-Am	Includes Saltbush, Goosefoot, Pigweed, Winterfat, & Others	206	220	203	215	40	110
Other Compositae	Includes Rabbitbrush, Snakeweed, Sunflower, & Others	10	22	19	16	10	37
Liguliflorae	Chicory-type	0	0	0	0	2	0
Ambrosia	Ragweed, Bursage	1	1	4	2	2	1
Gramineae	Grass Family	2	3	4	1	1	2
Sphaeralcea	Globemallow	3	4	2	1	1	1
Eriogonum	Buckwheat	1	0	0	1	2	1
Cruciferae	Mustard Family	0	1	1	0	0	0
Leguminosae	Pea Family	0	0	0	1	0	0
Caryophyllaceae	Pink Family	0	0	0	0	0	0
Labiatae	Mint Family	0	0	0	1	1	0
Umbelliferae	Parsley Family	0	0	0	0	0	0
Cyperaceae	Sedge	0	0	0	0	1	0
Potamogeton/Typha	Pondweed/Cattail	0	0	0	0	0	0
Total Aggregates	Pollen Clumps	15	12	11	18	7	10
Cheno-Am Aggregates		14(20)	12(20)	11(20)	17(7)	6(8)	7(10)
Other Compositae Aggregates		1(2)	0	0	1(2)	1(2)	3(3)
Juniperus Aggregates		0	0	0	0	0	0
Pinus edulis Aggregates		0	0	0	0	0	0
Trilete Spore		0	0	0	1	0	0
Pre-Quaternary Palynomorph		0	0	0	0	0	4

Table 1. Pollen Data.

Site Number		5LA3570	5LA463	5LA4632	5LA4632	5LA5008	5LA5008
Sample FS Number		30	12	13	14	Surface	101
Stratum/Context		Feature 11	1 Control	2	3 Cultural	Control for Washes	Metate Wash
Pollen Sum		201	314	2	1	319	397
Tracers		84	47	26	26	9	20
Pollen Concentration grains/cc or grains/wash		3230.4	9019.1	103.8	51.9	47850.0	535950.0
Taxa Name	Common Name						
Degraded	Unidentifiable	28	6	2	0	21	8
Picea	Spruce	2	1	0	0	5	1
Abies	Fir	0	0	0	0	1	0
Other Pinus	Other Pines	20	7	0	0	40	33
Pinus edulis	Pinyon	0	2	0	0	26	4
Juniperus	Juniper	0	231	0	1	74	270
Quercus-type	Oak	0	0	0	0	0	2
cf. Fraxinus	Ash	0	0	0	0	0	0
Artemisia	Sagebrush	0	6	0	0	14	7
Ephedra	Mormon Tea	0	0	0	0	0	0
Cercocarpus	Mountain Mahogony	0	0	0	0	0	2
Sarcobatus	Greasewood	0	0	0	0	0	0
Cheno-Am	Includes Saltbush, Goosefoot, Pigweed, Winterfat, & Others	106	25	0	0	78	37
Other Compositae	Includes Rabbitbrush, Snakeweed, Sunflower, & Others	44	18	0	0	38	19
Liguliflorae	Chicory-type	0	0	0	0	0	0
Ambrosia	Ragweed, Bursage	0	4	0	0	8	3
Gramineae	Grass Family	0	5	0	0	8	2
Sphaeralcea	Globemallow	0	0	0	0	2	0
Eriogonum	Buckwheat	0	3	0	0	0	3
Cruciferae	Mustard Family	0	0	0	0	0	2
Leguminosae	Pea Family	0	0	0	0	1	0
Caryophyllaceae	Pink Family	0	0	0	0	0	1
Labiatae	Mint Family	0	0	0	0	1	3
Umbelliferae	Parsley Family	0	0	0	0	1	0
Cyperaceae	Sedge	0	0	0	0	0	0
Potamogeton/Typha	Pondweed/Cattail	0	1	0	0	0	0
Total Aggregates	Pollen Clumps	1	5	0	0	1	0
Cheno-Am Aggregates		1(2)	0	0	0	0	0
Other Compositae Aggregates		0	1(3)	0	0	0	0
Juniperus Aggregates		0	4(7)	0	0	0	0
Pinus edulis Aggregates		0	0	0	0	1(3)	0
Trilete Spore		0	0	0	0	0	0
Pre-Quaternary Palynomorph		0	0	0	0	0	0

Table 1. Pollen Data.

Site Number		5LA5008	5LA4632
Sample FS Number		102	11
Stratum/Context		Mano Wash	Mano Wash
Pollen Sum		473	102
Tracers		34	151
Pollen Concentration grains/cc or grains/wash		375617.6	18238.4
Taxa Name	Common Name		
Degraded	Unidentifiable	5	8
Picea	Spruce	0	0
Abies	Fir	0	0
Other Pinus	Other Pines	36	1
Pinus edulis	Pinyon	14	1
Juniperus	Juniper	354	19
Quercus-type	Oak	2	0
cf. Fraxinus	Ash	1	0
Artemisia	Sagebrush	1	3
Ephedra	Mormon Tea	0	0
Cercocarpus	Mountain Mahogony	1	0
Sarcobatus	Greasewood	0	0
Cheno-Am	Includes Saltbush, Goosefoot, Pigweed, Winterfat, & Others	20	28
Other Compositae	Includes Rabbitbrush, Snakeweed, Sunflower, & Others	25	34
Liguliflorae	Chicory-type	0	0
Ambrosia	Ragweed, Bursage	4	2
Gramineae	Grass Family	3	2
Sphaeralcea	Globemallow	0	0
Eriogonum	Buckwheat	2	2
Cruciferae	Mustard Family	0	0
Leguminosae	Pea Family	0	0
Caryophyllaceae	Pink Family	1	0
Labiatae	Mint Family	1	2
Umbelliferae	Parsley Family	0	0
Cyperaceae	Sedge	0	0
Potamogeton/Typha	Pondweed/Cattail	0	0
Total Aggregates	Pollen Clumps	3	0
Cheno-Am Aggregates		3(4)	0
Other Compositae Aggregates		0	0
Juniperus Aggregates		0	0
Pinus edulis Aggregates		0	0
Trilete Spore		0	0
Pre-Quaternary Palynomorph		0	0

Pollen Percentage Data

Site Number		5LA3570	5LA3570	5LA3570	5LA3570	5LA3570	5LA3570	5LA3570
Sample FS Number		25	26	27	28	29	31	30
Stratum/Context		1	2	3	4	5	Feature 11	Feature 11
Pollen Sum		319	344	315	312	114	217	201
Tracers		15	11	36	41	186	148	84
Pollen Concentration grains/cc or grains/wash		28710.0	42218.2	11812.5	10273.2	827.4	1979.4	3230.4
Taxa Name	Common Name							
Degraded	Unidentifiable	4.1	4.1	3.8	2.6	12.3	6.5	13.9
Picea	Spruce	0.3	0.3	1.6	2.6	0.0	0.0	1.0
Abies	Fir	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Pinus	Other Pines	10.7	7.0	9.2	9.0	12.3	6.9	10.0
Pinus edulis	Pinyon	5.3	7.3	5.1	1.6	8.8	3.2	0.0
Juniperus	Juniper	4.7	2.3	2.2	1.0	4.4	7.8	0.0
Quercus-type	Oak	0.0	0.0	0.0	0.0	0.0	0.0	0.0
cf. Fraxinus	Ash	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Artemisia	Sagebrush	0.3	2.6	0.6	1.0	1.8	0.9	0.0
Ephedra	Mormon Tea	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Cercocarpus	Mountain Mahogony	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sarcobatus	Greasewood	0.0	0.0	0.0	0.0	1.8	0.0	0.0
Cheno-Am	Includes Saltbush, Goosefoot, Pigweed, & Others	64.6	64.0	64.4	68.9	35.1	50.7	52.7
Other Compositae	Includes Rabbitbrush, Snakeweed, Sunflower, & Others	3.1	6.4	6.0	5.1	8.8	17.1	21.9
Liguliflorae	Chicory-type	0.0	0.0	0.0	0.0	1.8	0.0	0.0
Ambrosia	Ragweed, Bursage	0.3	0.3	1.3	0.6	1.8	0.5	0.0
Gramineae	Grass Family	0.6	0.9	1.3	0.3	0.9	0.9	0.0
Sphaeralcea	Globemallow	0.9	1.2	0.6	0.3	0.9	0.5	0.0
Eriogonum	Buckwheat	0.3	0.0	0.0	0.3	1.8	0.5	0.0
Cruciferae	Mustard Family	0.0	0.3	0.3	0.0	0.0	0.0	0.0
Leguminosae	Pea Family	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Caryophyllaceae	Pink Family	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Labiatae	Mint Family	0.0	0.0	0.0	0.3	0.9	0.0	0.0
Umbelliferae	Parsley Family	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cyperaceae	Sedge	0.0	0.0	0.0	0.0	0.9	0.0	0.0
Potamogeton/Typha	Pondweed/Cattail	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Aggregates	Pollen Clumps	4.7	3.5	3.5	5.8	6.1	4.6	0.5
Cheno-Am Aggregates		14	12	11	17	6	7	1
Other Compositae Aggregates		1	0	0	1	1	3	0
Juniperus Aggregates		0	0	0	0	0	0	0
Pinus edulis Aggregates		0	0	0	0	0	0	0
Trilete Spore		0	0	0	1	0	0	0
Pre-Quaternary Palynomorph		0	0	0	0	0	4	0

Pollen Percentage Data

Site Number		5LA4632	5LA4632	5LA4632	5LA5008	5LA5008	5LA5008	5LA4632
Sample FS Number		12	13	14	Surface	101	102	11
Stratum/Context		1	2	3	Wash Control	Metate	Mano	Mano
Pollen Sum		314	2	1	319	397	473	102
Tracers		47	26	26	9	20	34	151
Pollen Concentration grains/cc or grains/wash		9019.1	103.8	51.9	47850.0	535950.0	375617.6	18238.4
Taxa Name	Common Name							
Degraded	Unidentifiable	1.9	0.0	0.0	6.6	2.0	1.1	7.8
Picea	Spruce	0.3	0.0	0.0	1.6	0.3	0.0	0.0
Abies	Fir	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Other Pinus	Other Pines	2.2	0.0	0.0	12.5	8.3	7.6	1.0
Pinus edulis	Pinyon	0.6	0.0	0.0	8.2	1.0	3.0	1.0
Juniperus	Juniper	73.6	0.0	0.3	23.2	68.0	74.8	18.6
Quercus-type	Oak	0.0	0.0	0.0	0.0	0.5	0.4	0.0
cf. Fraxinus	Ash	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Artemisia	Sagebrush	1.9	0.0	0.0	4.4	1.8	0.2	2.9
Ephedra	Mormon Tea	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cercocarpus	Mountain Mahogony	0.0	0.0	0.0	0.0	0.5	0.2	0.0
Sarcobatus	Greasewood	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cheno-Am	Includes Saltbush, Goosefoot, Pigweed, & Others	8.0	0.0	0.0	24.5	9.3	4.2	27.5
Other Compositae	Includes Rabbitbrush, Snakeweed, Sunflower, & Others	5.7	0.0	0.0	11.9	4.8	5.3	33.3
Liguliflorae	Chicory-type	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ambrosia	Ragweed, Bursage	1.3	0.0	0.0	2.5	0.8	0.8	2.0
Gramineae	Grass Family	1.6	0.0	0.0	2.5	0.5	0.6	2.0
Sphaeralcea	Globemallow	0.0	0.0	0.0	0.6	0.0	0.0	0.0
Eriogonum	Buckwheat	1.0	0.0	0.0	0.0	0.8	0.4	2.0
Cruciferae	Mustard Family	0.0	0.0	0.0	0.0	0.5	0.0	0.0
Leguminosae	Pea Family	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Caryophyllaceae	Pink Family	0.0	0.0	0.0	0.0	0.3	0.2	0.0
Labiatae	Mint Family	0.0	0.0	0.0	0.3	0.8	0.2	2.0
Umbelliferae	Parsley Family	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Cyperaceae	Sedge	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Potamogeton/Typha	Pondweed/Cattail	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Total Aggregates	Pollen Clumps	1.6	0.0	0.0	0.3	0.0	0.6	0.0
Cheno-Am Aggregates		0	0	0	0	0	3	0
Other Compositae Aggregates		1	0	0	0	0	0	0
Juniperus Aggregates		4	0	0	0	0	0	0
Pinus edulis Aggregates		0	0	0	1	0	0	0
Trilete Spore		0	0	0	0	0	0	0
Pre-Quaternary Palynomorph		0	0	0	0	0	0	0

Appendix III

Hydration Analysis of Obsidian Artifacts from Sites 5AA952, 5LA3570, 5LA5360 and Site 3, Colorado

By:

Christopher M. Stevenson, Ph.D.
Diffusion Laboratory
Archaeological Services Consultants
4620 Indianola Ave.
Columbus, OH 43214

Submitted to :

Dr. Phil Duke
Dept. of Anthropology
Fort Lewis College
Durango, CO 81301-3999

March 1995

Seven obsidian artifacts were submitted to Diffusion Laboratory for chemical analysis and age determination using the obsidian hydration dating method. Five samples were obtained from subsurface contexts at Site 5AA952 and Site 3 located in the San Juan National Forest. Single samples were submitted from Site 5LA3570 (subsurface) and Site 5LA5360 (surface).

In order to calculate an absolute date for an obsidian artifact four analytical procedures need to be completed. First, the amount of surface hydration, or the thickness of the hydration rim, must be measured. Second, the geological origin of the artifact needs to be ascertained in order that the appropriate set of rate constants, particular to each glass type, may be applied. Third, the hydration rate constants for each chemically distinct natural

glass are determined in the laboratory under elevated temperature and pressure. Lastly, the soil temperature and relative humidity at the archaeological site is estimated in order that the rate of hydration estimated at high temperature may be adjusted to reflect the hydration temperature at the prehistoric site. Each of the analytical steps is discussed below.

Hydration Rim Measurement

A thin section was prepared for the sample under the guidelines presented by Michels and Bebrich (1971). Hydration rim width measurements were made at 800X using a Watson image-splitting measurement instrument (Scheetz and Stevenson 1988). Seven independent measurements were made and a mean value calculated (Table 1). A 0.1 um error value was used to calculate the uncertainty factor for each age determination. Hydration rims were observed on all specimens.

Compositional Analysis

Northern New Mexico contains several large obsidian flows. The extrusion points for the glasses are located in the Jemez Mountain region, No Agua Peaks, or at Grants Ridge. The erosion of the high silica rhyolite flows has also resulted in the deposition and transport of obsidian within the and Rio Grande river to locations as far south as El Paso, Texas (Stevenson and McCurry 1990). In addition, obsidian from these sources was acquired directly from the flow and exchanged or traded. As a consequence, chemically distinct obsidians with different rates of hydration may be present at a prehistoric site. The situation requires that each of the artifacts be chemically analyzed to determine the geological source. Once completed, the appropriate rate constants may then be applied.

In this study quantitative chemical analyses were conducted using X-ray fluorescence analysis. The results of the analysis (see attachment) indicated that the obsidian samples belonged to either the Polvadera Peak (N=6) or the Cerro del Medio (N=1) obsidian sources.

Hydration Rate Development

Hydration rates for Polvadera Peak and Cerro del Medio have been developed in the laboratory. Under conditions of high temperature and pressure (Stevenson et al. 1989) freshly flaked samples were hydrated in a silica saturated solution or at 100% relative humidity between temperatures of 150°C and 180°C for periods of up to 31 days. At the end of the reaction periods each sample was thin sectioned and the hydration rim measured. The induced rims were used to calculate the activation energy and the preexponential. With these constants the hydration rate determined at high temperature may be extrapolated to reflect the ambient conditions present at the archaeological site.

Soil Temperature and Relative Humidity Estimations

Soil temperature and soil relative humidity significantly affect the rate of hydration (Mazer et al. 1991). These data have not been directly measured for the project areas. Therefore, in order to estimate the effective hydration temperature (EHT) of the archaeological site, air temperature information provided by the client was utilized. Monthly mean temperatures were input into Lee's (1969) temperature integration equation:

$$EHT = \frac{(Ta + 1.2316) + (0.1607 * Rt)}{1.0645}$$

where: Ta= mean annual temperature (°C)
Rt= temperature range (July minus January monthly mean)

This resulted in an EHT of 10.39°C for Site 5AA952, and an EHT of 16.86°C for Site 5LA3570, Site 5LA5360, and Site 3. These temperatures were used to adjust the laboratory hydration rates to reflect site temperature conditions.

The annual relative humidity beneath the ground surface was estimated to be 100%. The relative humidity on the ground surface was estimated to be 90%. As a result the hydration rate for the surface specimen at Site 5LA5360 was reduced by 10% (Mazer et al. 1991) to arrive at the final rate used in the calculation of absolute ages.

Age Estimation

Using the estimated effective hydration temperatures, hydration rates for the obsidian artifacts may now be calculated. The estimate high temperature hydration rate (160°C) is extrapolated to the hydration rate at the estimated EHT for the project area using the Arrhenius equation:

$$K = k' \text{ EXP } E/RT$$

where K = archaeological hydration rate (um^2/day)
k'= preexponential (um^2/day at 160°C)
E = activation energy (J/mol)
R = universal gas constant
T = effective hydration temperature in degrees Kelvin

The hydration rates at the estimated EHT values are presented on Table 2.

Note

It should be noted that laboratory hydration rate constants are experimental and subject to evaluation and revision. Similarly, estimates of soil temperature and relative humidity from other areas are approximations and are no substitute for direct thermal monitoring of the archaeological site. Because the rate of water diffusion into glass is an exponential function of temperature, small differences in temperature can profoundly effect the hydration rate. Therefore, the absolute dates calculated in this report are subject to revision when direct soil temperature and relative humidity measurements become available.

References

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Table 1

Obsidian Hydration Rim Measurements and Dates

Lab No.	Provenience	Rim Source	Width(um)	S.D.	Date	S.D.
DL-94-369	5LA3570,TU1,L1,L5	Polvadera	2.78	0.1	1281 AD	49
DL-94-370	5LA5360, Surface	C. Medio	1.74	0.1	1305 AD	76
DL-94-371	Site 3, Lizard Head	Polvadera	2.14	0.1	1554 AD	38
DL-94-372	5AA952-C,TU4,L4	Polvadera	2.12	0.1	1110 AD	81
DL-94-373	5AA952-C,TU4,L4	Polvadera	2.10	0.1	1126 AD	80
DL-94-374	5AA952-D,TU6,L2,L5	Polvadera	2.14	0.1	1094 AD	82
DL-94-375	5AA952-F,TU1,L3,L7	Polvadera	1.84	0.1	1317 AD	71

* An instrument error of 0.1 um was used to calculate the uncertainty factor for the sample.

Table 2

Hydration Constants and Rates

Obsidian Source	A(um^2/day)	E(J/mol)	EHT°C	Rh	Rate (um^2/1000yrs)
Polvadera Peak	2.19 @ 160°C	81324	10.39	100%	5.35
Polvadera Peak	2.19 @ 160°C	81324	16.86	100%	11.55
Cerro del Medio	1.48 @ 160°C	83115	10.39	90%	4.69

Pacific Legacy
Incorporated
cultural resources consultants

20 March 1995

Dr. Christopher M. Stevenson
Archaeological Services Consultants, Inc.
4620 Indianola Avenue
Columbus, OH 43214

Re.: EDXRF Analysis, Obsidian Artifacts DL94-369 - DL94-375

Dear Dr. Stevenson:

Attached please find EDXRF data sheets for the trace- and minor element concentration values for the seven analyzed artifacts. Analyses were conducted using a Spectrace 440 energy dispersive X-ray fluorescence spectrometer. The spectrometer is equipped with a Rh X-ray tube powered by a 50 kV X-ray generator. The X-ray tube is operated at 30 kV, .20 mA, using a 0.127 mm Rh filter under vacuum. Specimens are scanned for 250 seconds live-time for the elements Ti, Mn, Fe, Ni, Cu, Zn, Ga, Pb, Rb, Sr, Y, Zr, and Nb. The EDXRF system employs a Tracor X-ray TX 6100 X-ray analyzer and Tracor reduction software run on an IBM PC based microprocessor. Trace- and minor element intensities are converted to concentration estimates using a least squares calibration line developed by analysis of international rock standards.

Element concentration data in the attached table are reported as parts-per-million (ppm) by weight. Samples were analyzed as unmodified artifact samples (not powder). Values for Ni, Cu, and Ga are not reported because these are not recognized as useful in distinguishing among geological sources of obsidian. Mn and Fe values are semi-quantitative. The U.S.G.S. RGM-1 standard was included during analysis of unknowns to check machine calibration.

Based on the available trace-element data, six artifacts are determined to be of obsidian from the Polvadera Peak source; one from the Cerro del Medio source, New Mexico.

Sincerely,

Thomas L. Jackson, Ph.D.
Senior Archaeologist

rep001.016

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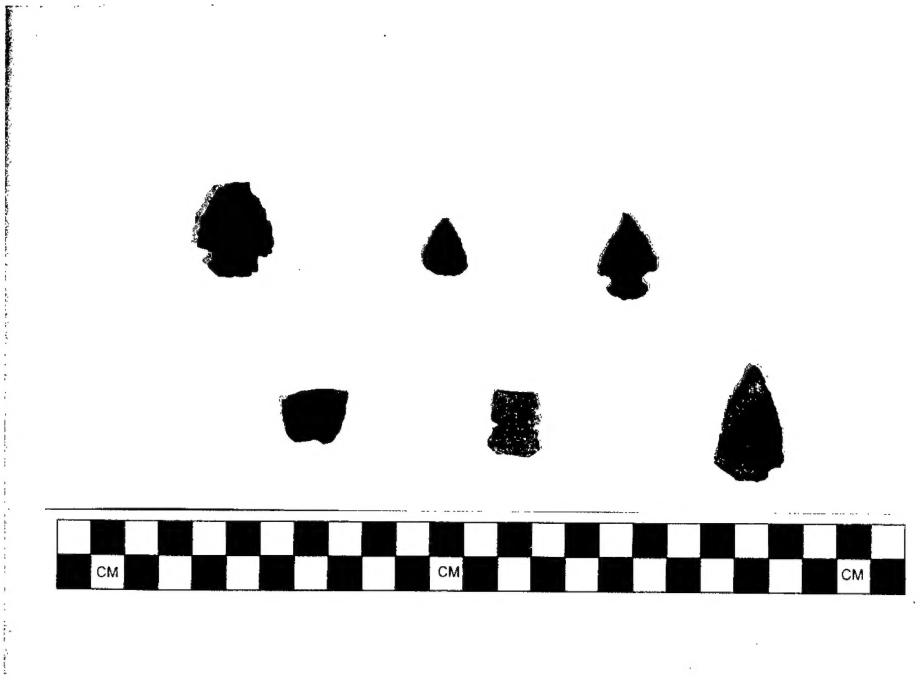
SAMPLE LABEL	TI/R1 PPM		MN/R1 PPM		FE/R1 PPM		PB/R1 PPM		TH/R1 PPM		RB/R1 PPM		SR/R1 PPM		Y/R1 PPM		ZR/R1 PPM		NB/R1 PPM		SOURCE ASSIGNMENT
RGM1	1,562.7	+-155.3	263.7	+-34.6	13,835.0	+-487.7	27.4	+-5.0	18.0	+-5.7	152.1	+-2.0	105.4	+-3.2	22.7	+-1.8	222.9	+-5.9	6.5	+-4.2	
DL94-369	774.7	+-168.8	371.5	+-38.3	6,999.3	+-490.6	29.7	+-5.3	22.4	+-6.8	139.6	+-2.7	12.7	+-3.4	15.9	+-2.4	63.2	+-6.0	39.4	+-4.6	PP
DL94-370	696.7	+-160.9	391.9	+-35.8	10,092.3	+-488.3	28.3	+-5.1	17.7	+-6.3	161.0	+-2.3	8.1	+-3.3	44.3	+-2.0	161.8	+-6.0	50.4	+-4.3	CdM
DL94-371	673.7	+-154.6	388.8	+-34.7	6,595.3	+-486.9	25.1	+-5.0	25.1	+-5.5	149.0	+-2.1	6.0	+-3.2	22.8	+-1.8	64.7	+-5.8	45.0	+-4.2	PP
DL94-372	1,148.3	+-153.6	378.5	+-35.1	9,573.4	+-487.5	26.0	+-5.0	27.2	+-5.5	154.3	+-2.1	9.0	+-3.2	23.4	+-1.8	67.0	+-5.9	45.4	+-4.2	PP
DL94-373	1,439.7	+-162.3	403.3	+-36.9	10,360.7	+-489.9	31.3	+-5.2	19.5	+-6.6	143.3	+-2.5	12.2	+-3.3	21.8	+-2.2	65.1	+-6.0	46.2	+-4.4	PP
DL94-374	2,083.6	+-157.7	425.4	+-35.7	15,114.4	+-489.1	28.5	+-5.0	28.3	+-5.6	150.8	+-2.2	20.5	+-3.2	22.1	+-1.9	72.4	+-5.9	45.7	+-4.3	PP
DL94-375	667.4	+-176.3	315.5	+-38.7	6,490.9	+-490.9	30.8	+-5.3	22.0	+-6.9	129.2	+-2.7	6.4	+-3.5	20.5	+-2.4	61.7	+-6.1	37.1	+-4.6	PP

RGM1=USGS Reference Standard
PP=Polvadera Peak
CdM=Cerro del Medio

Appendix IV

Projectile Points Collected During Previous Site Inventory



Top Row:	5LA3347.53.1	5LA3347.21.1	5LA3570.5.1
Bottom Row:	5LA4606.0.5	5LA4854.0.1	5LA5008.0.7